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ABSTRACT OF A

Hunterian Lecture

ON

PAGET'S DISEASE OF THE NIPPLE.*

Delivered before the Royal College of Surgeons of England on Feb. 16th, 1917,

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MR. PRESIDENT AND GENTLEMEN,—It is impossible to lecture on Paget's Disease of the Nipple without quoting from his original paper,[1] not only as a token of respect to pioneer work, but also because little of importance has since been added to its discoverer's clinical description of the disease. Moreover, it is impossible to summarise the paper, for it possesses in the highest degree those virtues of compression and concentration which are sometimes lacking in the medical writing of to-day. Sir James Paget says:—

I believe it has not yet been published that certain chronic affections of the skin of the nipple and areola are very often succeeded by the formation of scirrhous cancer in the mammary gland. I have seen about 15 cases in which this has happened, and the events were in all of them so similar that one description may suffice.

The patients were all women, various in age from 40 to 60 or more years, having in common nothing remarkable but their disease. In all of them the disease began as an eruption on the nipple and areola. In the majority it had the appearance of a florid, intensely red, raw surface, very finely granular, as if nearly the whole thickness of the epidermis were removed; like the surface of very acute diffuse eczema or like that of an acute balanitis. From such a surface, on the whole or greater part of the nipple and areola, there was always copious, clear, yellowish, viscid exudation.

..... it has happened that in every case which I have been able to watch, cancer of the mammary gland has followed within at the most two years, and usually within one year. The eruption has resisted all the treatment, both local and general, that has been used, and has continued even after the affected part of the skin has been involved in the cancerous disease.

The formation of cancer has not in any case taken place first in the diseased part of the skin. It has always been in the substance in the mammary gland, beneath or not far from the diseased skin, and always with a clear interval of apparently healthy tissue.

Subsequent Observations.

Erichsen drew attention to the sharp definition of the eczematous patch, and made the important observation that the affected area is slightly indurated, a point of distinction from ordinary chronic eczema. Wickham and Bowlby noted the flattening and disappearance of the nipple, sometimes passing into retraction, which is a constant feature of the disease.

A specimen in the Museum of the Cancer Hospital, taken from a case under the care of Mr. Charles Ryall, appears to indicate that Paget's disease may undergo complete spontaneous healing. In this case a carcinoma is present in the subjacent breast. Partial attempts at epitheliation are frequently seen in the diseased area.

Histology.

Two years after Paget's disease had been described the foundations of its histology were well and truly laid by Sir H. T. Butlin. He found that the mucous layer of the epidermis of the eczematous skin underwent proliferation and increased in thickness. It was occasionally traversed by fine fibrous bands, fibro-cells or spindle-cells. The corium and subcutaneous tissue were indurated and infiltrated with small round cells (leucocytes). The milk-ducts were widely open or distended. They were not lined as in the normal condition by cylindrical epithelium, but contained frequently large masses of epithelium of the squamous or glandular form. The connective tissue round the ducts was often infiltrated with small round cells. These changes in the ducts extended into the breast an inch or more beneath the nipple. In one of the two cases examined the acini showed a proliferation similar to that often observed in the neighbourhood of carcinoma of the breast.[2]

Butlin's observations are a very accurate description of the histological appearances. He inferred from them, as Paget did also, and both, I think, erroneously, that the eczema was the primary condition, and that the deeper changes were the result of it. It is to be specially noticed that Butlin found no sign of malignancy in the surface epithelium, and he noted the interesting fact, to which I shall again refer, that it might be invaded by the connective tissue of the dermis. He noted the induration and infiltration of the corium, which I believe to be an important guide to the pathogenesis of the disease.

ENUMERATION OF ERRONEOUS PATHOLOGICAL VIEWS.

Since 1876 the exact pathology of Paget's disease has remained a perennial subject of doubt and debate. It may be well at the outset to clear the ground by enumerating those views concerning it which are beyond doubt erroneous.

Is Paget's disease an ordinary eczema? On the joint authority of Dr. Graham Little and of my colleague Dr. Pringle, I can tell you that the microscopic appearances of Paget's disease are quite unlike those of an ordinary eczema. Moreover, ordinary eczema of the nipple yields to treatment, and induration is absent in chronic eczema.

Parasitic theory of Darier.—In 1889 Darier found within the squamous epithelial cells of the diseased nipple certain peculiar appearances, now generally admitted to be the result of cell-degeneration, which he believed to indicate the presence of intracellular parasites. His views gave rise to an extensive literature and to an admirable monograph by Wickham, but since he has had the courage and frankness to abandon them they need not further detain us.

Distinction from squamous-celled carcinoma of the nipple.—It is necessary to distinguish sharply between squamous-celled carcinoma of the nipple and Paget's disease. Dr. Browning has lent me a characteristic example of squamous carcinoma which I now show you. In squamous-celled carcinoma of the nipple there is seen a hard, elevated tumour of greater area than the normal nipple, which it replaces, and bounded by an everted or rampart-like edge. The flattened top of the swelling is irregular from ulceration, often sloughy, and it lacks the smoothness and brilliant colour which characterise Paget's disease. Microscopically, squamous carcinoma presents the usual blunt down-growing columns of prickle epithelium containing cell-nests, while in Paget's disease, though the papillæ are exaggerated and the thickened stratum mucosum may show a few rudimentary cell-nests, there is no sign of invasion of the dermis by the overlying epidermis.

Paget stated rightly that the formation of cancer never takes place first in the diseased portion of the skin, though the eczematous surface might later become involved in the cancerous tissues from which at first it was separated by an interval.

Several observers have found microscopic evidence in Paget's disease of epitheliomatous down-growth such as precedes or constitutes a squamous carcinoma of the skin; among them are to be reckoned Darier, Karg, Fisse, and Rolleston and Hunt. Butlin and Wickham found appearances suggestive of squamous carcinoma. Bowlby, Unna, and G. T. Jackson reject the idea. What is the reason for this conflict of evidence? It appears to depend first upon the fact that squamous carcinoma of the nipple is sometimes erroneously diagnosed as Paget's disease upon clinical examination. But it chiefly arises from this circumstance that in Paget's disease there is elongation of the inter-papillary columns of epithelium (Wickham, Bowlby, Rolleston and Hunt), together with an invasion of the epidermis by islets of fibrous tissue. It will be shown later that this elongation is due to passive stretching, not to active down-growth.

We may, I think, dismiss the view that there is any real connexion between Paget's disease and squamous carcinoma of the nipple, though it still holds a place in some current text-books of pathology. But a word must be said about a curious German variant of this theory.

Intra-epidermal carcinoma.—The degenerate deeper layers of the epidermis which contain the large clear cells known as Paget's cells, were taken by Schambacher to be a layer of

* This lecture will appear in full with illustrations in an early number of the British Journal of Surgery.

[1] Sir James Paget, St. Bartholomew's Hospital Reports, 1874, x.

[2] The Minute Anatomy of Two Breasts, the areolæ of which had been the seat of long-standing eczema, by Henry Trentham Butlin, F.R.C.S., Surgical Registrar to St. Bartholomew's Hospital, Medico-Chirurgical Transactions, 1876, lix., 108-9.

malignant epithelium thrusting itself between the dermis and the superficial layers of the epidermis. He and Jacobaeus thought they could sometimes trace a continuity between these cells and the cells of a glandular carcinoma of the breast beneath.

This is not the case in any specimen I have examined. In some exceptional cases the carcinoma beneath may infiltrate up to the epidermis, and its cells may abut on squamous epithelium. But the relation is one of contiguity or slight intermixture, for, as Fisse truly stated, the two varieties of cells remain easily distinguishable at a little distance from their point of contact.[3]

CHANGES IN THE EPIDERMIS IN PAGET'S DISEASE.

What, then, in point of fact are the changes which are found in the epidermis in Paget's disease? They may be divided into two stages, hypertrophic occurring at the periphery of the affected area, and atrophic occurring at its centre. Over the whole area the horny epithelium has for the most exfoliated and disappeared.

Hypertrophic Stage.

Butlin, Thin, Duhring, and Wile drew attention to the proliferative thickening seen in the deeper layer, or stratum Malpighii of the epidermis. This proliferation accounts for the slightly elevated, sharply defined border which clinically characterises the disease (Thin, Duhring, Wickham). Wickham accurately pictures the epidermis as riddled with vacuoles and presenting cellular disorganisation with consecutive proliferation. The cells dissociate and lose their normal close cohesion. The individual cells display the polymorphic degeneration on which the parasitic theory was founded. Rifts and clefts appear in the close structure of the epithelium, more especially in the interpapillary processes which often display a central cavity or vacuole-like space (Duhring and Wile). Duhring, Wile, Rolleston, and Hunt agree in describing this process as an œdematous degeneration of the epidermis, a description clinically confirmed by the thin alkaline discharge characteristic of the disease. The length of the interpapillary columns of epithelium is much increased, sometimes to four times the normal. But the naked eye, or a low power of the microscope, shows that the general boundary line between epidermis and dermis remains perfectly defined, without a suggestion of epitheliomatous downgrowth.

Atrophic Stage.

The gradual ruin of the epidermal architecture is hastened by intrusive bands of fibrous tissue or islets of round-celled infiltration which insinuate themselves into the clefts of the moribund epidermis like ivy in an old wall. The overgrown stratum Malpighii no longer holds together, and is reduced to a layer two or three cells thick, or is completely cast off in the discharge, exposing the tips of the papillæ. The elongated interpapillary columns degenerate and disappear. During this process islets of epithelium, which simulate epithelial downgrowths, are often for a time left embedded in the fibrous tissue. But at a later stage the interpapillary columns have disappeared, and the papillæ are in consequence laterally fused and unrecognisable. Finally, and this stage is not often reached, the surface of the nipple is bare of epithelium, and is formed by a layer of granulation tissue.

From this account it is obvious that the epidermis is the passive victim of deeper changes, not the assailant of the tissues beneath. No analogy can be drawn between the flat florid weeping surface of Paget's disease, persisting for long periods without ulceration or fungation, and any known form of malignant disease. Here I may turn aside for a moment to consider other cases in which degenerating or ill-nourished epithelium suffers invasion by fibrous tissue.

Invasion of the epithelial layer of the skin by fibrous tissue is a process which is very common though it is not recognised in works on pathology. It may be studied at the bottom of the tonsillar crypts where the squamous epithelium is seen in the process of destruction by intrusive bands of fibrous tissue. I have shown that de Morgan's spots, which are such common manifestations of cutaneous senility, are due to telangiectases occurring in intrusive islets of fibrous tissue embedded in the thickness of the epithelial layer of the skin.[4]

Our discussion so far has led us to reject the parasitic theory of Paget's disease, to distinguish the affection sharply from epithelioma and to conclude with certainty that the surface epithelium of the affected nipple is not the seat of any malignant change, but that the changes in it are inflammatory or nutritional only and dependent upon œdema.

CHANGES IN THE DERMIS.

We have considered the changes in the epidermis, those in the dermis remain to be described.

Broadly speaking they consist of œdematous swelling of the papillæ, with consequent stretching of the interpapillary columns of epithelium. A band of round-celled infiltration is seen in the papillary layer, separated at first by a narrow interval of intact dermis from the overlying epithelium. According to Unna, this band of infiltration is composed chiefly of plasma cells. It lies in the plane in which the cutaneous lymphatics originate, a point to be especially noted. In some specimens the band of infiltration is absent, the superficial layer of the dermis is fibrotic, and the papillæ have disappeared, appearances indicating the fibrosis which ultimately results from round-celled infiltration. The dermis is thickened, producing the superficial induration which is clinically evident.

The deeper layers of the dermis, though they show thickening, are otherwise little changed. They show perivascular collections of round cells, and in some specimens groups of epithelial cells lying in lymphatic spaces can be seen. This description, based upon my own observation, can be confirmed in every particular upon a perusal of the literature of the subject. Broadly speaking, it shows a chronic œdema of the dermis with pachydermia.

As the papillæ increase in size they stretch the interpapillary columns of epithelium and produce the deceptive appearance of downgrowth in these columns which has been noted by so many observers. Later the mutual pressure of the swollen papillæ leads to the atrophy and disappearance of the interpapillary columns. The fused papillæ are then no longer recognisable, and they appear to undergo a process of fibrosis which flattens them out. The overlying epithelium, partly as the result of mechanical stretching and partly from œdema, suffers the changes already described. It is probable that in these changes superficial bacterial infection plays some secondary part, though an undetermined one. Of course, staphylococci are always present in the epidermis.

CARCINOMA THE PRECURSOR OF PAGET'S DISEASE.

We must next consider a paper by Dr. George Thin, published in 1881. Thin put forward the view that the primary lesion is an ordinary carcinoma of the breast, originating in the ducts, and that the changes in the nipple are secondary both in time and in importance. As Thin truly says[5]:—

From what we know of the slow changes that frequently mark the earlier stages of cancer of the skin (in rodent cancer, for example), there can be little difficulty in accepting it as probable that cancerous changes are developing in the ducts long before they have given rise to sufficient induration to produce a palpable tumour.

His paper marks, in my opinion, a great advance. It has unfortunately been misunderstood owing to an unfortunate choice of title. In order to distinguish Paget's eczema sharply from true eczema he suggested for the former condition the name "malignant papillary dermatitis." The word "malignant" is misleading, for it suggests what Dr. Thin did not believe—the malignancy of the surface epithelium in Paget's disease.

To prove in all cases the correctness of Thin's view that carcinoma of the breast precedes eczema is impossible. But there is much evidence in its favour.

Impalpable Carcinoma.

A carcinoma of the breast may exist for years, may permeate the breast-lymphatics, may disseminate, and may cause death without ever giving rise to a palpable tumour in the breast. Time forbids me to discuss this subject in detail, and I have dealt with it fully elsewhere. This drawing which I show you is an impalpable carcinoma arising in a breast rather shrunken and indurated by chronic mastitis. The growth was not adherent to skin or fascia, and could not be distinguished by touch from the granular mastitic induration of the remaining part of the breast. But it had already given rise to infection of the axillary glands at the time when I removed the breast.

You are familiar with cases where a mass of carcinomatous glands develops in the axilla, secondary to a carcinoma of the

[3] *Nature of the carcinoma accompanying Paget's disease.*—In the microscopic examination of specimens of breast carcinoma accompanied by Paget's disease, though most observers agree with Thin that the growth is usually a duct carcinoma, doubt may arise whether the growth is an ordinary spheroidal-celled carcinoma. Sometimes the appearances of both forms of growth are present, as in Jordan Lloyd's case and in one of my own. This difficulty has been cleared up by Lenthal Cheatle, who has proved that many so-called spheroidal-celled growths are really duct carcinomata in which the epithelium has lost its original columnar character.

[4] Handley's Archives of the Middlesex Hospital.

[5] Thin: Brit. Med. Jour., May 14th and 21st, 1881.

breast which can only be detected by microscopic examination.

In Paget's disease flattening or retraction of the nipple is an early sign, appearing long before a lump is felt in the breast. It is recognised as peculiarly a sign of carcinoma. Yet even at the time when a lump can be felt it is rare to find enlarged axillary glands (Wickham). The combination of characters—early retraction and long freedom of glands—indicates a chronic carcinoma of low virulence.

There is, therefore, no improbability in the assumption that carcinoma precedes and causes Paget's disease even when no lump can be felt in the breast.

In this connexion Mr. Lenthal Cheatle's case is of interest. By his method of large sections cut with a giant microtome he found a minute focus of carcinoma in a breast the seat of Paget's disease, although clinically and macroscopically there was no sign of carcinoma in the breast.

I may remind you that in not a single case of Paget's series did a carcinoma fail to show itself sooner or later, and in no case did the carcinoma first show itself in the diseased area of skin. Jamieson, quoted by Sheild, relates a case in which Paget's disease persisted for 20 years without the development of a cancer in the breast. Even in such a case the presence of a cancer during the whole period cannot be excluded, for the life of a breast carcinoma may exceed this duration, and it is even possible that the growth might undergo spontaneous cure, leaving Paget's disease as a result.

HOW DOES A CARCINOMA OF THE BREAST CAUSE PAGET'S DISEASE?

Accepting Thin's view that Paget's disease results from a pre-existing carcinoma, we are arrested by the question, How does carcinoma cause Paget's disease?

Thin believed that the papillary dermatitis, or so-called Paget's eczema, resulted from the irritant action of an acrid cancerous discharge from the mouths of the milk ducts. The suggestion is unconvincing, for Paget's disease may appear in cases where no moisture about the nipple has at any time been noticed.

In approaching this question I will ask you to recall to your memory certain researches of mine on the dissemination of carcinoma which date back to the year 1904. It may now be regarded as established that the main factor in the dissemination of carcinoma is the process of permeation, the growth of tendril-like cylinders of cancer cells along the easy routes provided by the lumina of the lymphatic vessels. This process must be sharply distinguished from infiltration of the tissue interspaces.

Obviously one of the results of permeation is to block the lymphatic vessels. It was, therefore, not surprising to find that lymphatic œdema frequently follows in the tissues whose lymph should normally drain away along the obstructed lymphatic vessels. Œdema may sometimes come on before permeation has reached the lymphatic vessels of the œdematous part owing to a block lower down the course of the lymphatic stream.

The commonest example of this condition is early cancer *en cuirasse*, which in its origin, and apart from the nodular invasion by cancer which accompanies its later stages, is a pure lymphatic œdema due to the blocking of the lymphatics of the subjacent fascial plexus by permeation. I have suggested for it the name "cancerous pachydermia." The affected skin becomes thick and leathery, and in one early example which I examined the thin skin of the breast had attained a thickness of 6 mm., though it showed no sign of cancerous infiltration. Sometimes, but not usually, the affected skin becomes red and discoloured or again covered by eczematous crusts.

Histologically the epithelium is found thin and atrophic with its horny layer peeling off. Round-celled infiltration may be found in the superficial layers of the dermis, while in the deeper layers are perivascular collections of similar round cells, marking out the track of the obstructed lymphatics. The papillæ of the dermis, at first swollen by œdema, are later flattened out and obliterated by a secondary fibrosis.

Causation by Œdema due to Permeation of Lymphatics.

The similarity of these appearances with those seen in the skin of the nipple in Paget's disease was too strong to be overlooked, and I formed the definite opinion that Paget's disease is due to lymphatic œdema of the nipple dependent on the blocking of the lymphatics by permeation extending from a pre-existing carcinoma of the breast. The idea was confirmed by the definite papyraceous induration which is found in the affected area. It explained the persistence of the smooth, red, raw area over long periods of time without marked tendency to ulcerate or fungate—facts impossible to associate with a surface composed of malignant tissue. The serous discharge was a lymphorrhœa from the blocked area of the skin. The association of chronic "eczema" with lymphatic œdema is a familiar one, often seen on the legs in cases of elephantiasis and in other milder grades of lymphatic obstruction. The peculiarities of Paget's "eczema" might be explained by the anatomical peculiarities of the nipple, its rich blood-supply, its thin skin. The lymphatics of the ducts converging to the subareolar plexus would naturally carry permeation with especial rapidity to this plexus in the form of growth—namely, duct cancer, which is particularly associated with Paget's disease. Subsequent fibrosis of these lymphatics would naturally lead to flattening or retraction of the nipple.

But upon consideration it appeared to me that the case thus made out was a *prima facie* one only. Since 1904 I have taken such opportunities of examining cases of Paget's disease as have presented themselves, hoping to find a case in which permeation could be demonstrated. Meantime in 1912 I put my views briefly on record as a statement of opinion.[6]

The difficulty to be overcome lay in the fugitive nature of the process of permeation. A permeated lymphatic becomes distended by the growth of the cancer cells within it, and an inflammatory reaction is thus excited. Round-celled infiltration is followed by fibrous tissue formation, and the included cylinder of cancer cells is ultimately strangled by the contraction of this newly formed fibrous tissue. The original lymphatic is now represented by a solid fibrous thread, and all local traces of the carcinoma have disappeared leaving lymphatic obstruction as a legacy.

It was not until after 12 years that by a fortunate chance I met with the very early example of Paget's disease which I shall now describe. It showed a perfect and nearly complete permeation of the lymphatic vessels of the "eczematous" area of skin. (Figs. 1 and 2.) In looking at the section I was able in some degree to share the sensations of the astronomer Adams when he first beheld the planet of his calculations in its predicted position.

A healthy looking and well-developed man of 49 was recently sent to me by Dr. J. W. F. Jewell. The patient noticed a button-like induration of the right nipple four months before he sought medical advice. There had been no pain and no discharge from the nipple. The nipple was flattened, while the areola, slightly raised above the surrounding surface, presented a bright red, slightly granular, dry surface with a few epidermal scales adherent to it. Beneath the indurated nipple was a little hard growth adherent to the overlying skin, but movable on the fascia beneath. The glands in the right axilla were hard and slightly enlarged. The growth was removed, together with the pectorals and the axillary glands, and the patient made a good recovery.

Histologically, the axillary glands were free from growth. The primary growth was a very cellular carcinoma, sharply marked off from the surrounding tissues. Its infiltrative powers were therefore rather low. On its cutaneous surface, however, it had obtained access to the subareolar lymphatic plexus, and so to the cutaneous lymphatics. These vessels were completely and perfectly injected as by an artificial injection fluid. In the papillary processes of the dermis the blunt finger-like dilated vessels forming the commencement of the lymphatic system were distended by cancer cells exactly like the cells of the growth. (Fig. 1.) The appearance presented is just that of a dilated lacteal in an intestinal villus. Running out of ampullæ of origin are narrower vessels which can be seen in some sections uniting in the superficial layers of the dermis to form vessels of capillary size, presenting the moniliform dilatations which characterise lymphatic vessels. These vessels take a course vertical or oblique to the skin surface, and in the sections are often cut longitudinally and present Y-shaped junctions. They run down to, and enter, the subareolar plexus, which is seen lying between the skin and the closely subjacent breast tissue as a number of vessels of larger diameter cut for the most part transversely, since the section is at right angles to the plane of the plexus.

Serial sections afford clear proof that the longitudinally cut groups of cancer cells really lie in cylindrical vessels and not in chink-like spaces. The whole arrangement of the vessels stamps them as belonging to the lymphatic and not the blood vascular system.

[6] Choyce's System of Surgery, vol. ii., p. 12.

In horizontal sections the comparison of the cancer-filled spaces in the papillæ with the lacteal of an intestinal villus still holds good. In such sections passing just deep to the apices of the papillæ a circular group of cancer cells occupies the middle of each papilla. This appearance could never be produced by fortuitous infiltration. It indicates with certainty that the cancer cells occupy pre-formed anatomical spaces—namely, the vessels of origin of the lymphatic system. (Fig. 2.)

Evidence Afforded by Above Case.

A superficial critic might assert that what I have taken to be lymphatic vessels are in truth excretory ducts, passing to open on the surface of the skin. A careful search through all my sections has shown that a zone of dermis invariably intervenes between the groups of cancer cells and the under surface of the epidermis. Moreover, it is obvious that the apices of the V-shaped unions of the vessels in question are directed away from the skin surface, not towards it, as would be the case if they belonged to the excretory apparatus of the skin. Moreover, in numerous sections of the normal nipple no similar appearance could be detected.

To complete the proof that my section shows lymphatics infected by cancer I attempted artificial injection of the lymphatics of the nipple with soluble Prussian blue. My efforts in this direction have been limited by the preoccupations of the war. But in one successful case the Prussian blue penetrated the papillæ of the skin almost to their tips, occupying the same central position as the cancer-filled spaces in my specimen. This specimen of injected skin must be allowed considerable anatomical value as demonstrating—so far as I know for the first time—the anatomy of the origins of the human cutaneous lymphatics. It seems possible that this knowledge may be the key to advances in our knowledge of the pathology of various diseases of the skin.

In regard to the actual measurements of my specimen of Paget's disease—

Over an area of 2·5 mm. the epidermis is reduced to a layer consisting of a thin sheet of the rete Malpighii with deeply extending interpapillary processes as much as 6 mm. in length—i.e., about four times the normal length. Beyond the periphery of this circle is an area of hypertrophied and thickened epidermis forming a circle with an outside diameter of 6 mm. Here also the interpapillary columns of epithelium are much elongated. This is due, not to downgrowth of the epithelium, but to œdematous hypertrophy of the papillæ of the corium, with consequent stretching of the interpapillary columns, for in the centre of the area the interpapillary columns are undergoing atrophy and some of them have disappeared altogether.

Permeation of the skin lymphatics is recognisable over a circle 6·5 mm. in diameter, and extends therefore just a little beyond the point where marked changes in the epithelium cease. Permeation of the subareolar plexus extends over an area of 10 mm.

These measurements show beneath the circular red area of dermatitis a larger circular area of permeated lymphatics, and beneath this again a still larger circular area of permeated deep lymphatics belonging to the subareolar plexus.

Now the tendency of Paget's disease to spread centrifugally from its point of origin is a commonplace. It may be inferred that that plane of the superficial tissues in which the affected circle is largest is the plane first affected. The relative size of the infection circles measures in terms of space the lapse of time since each of the layers was invaded, and therefore the order of their invasion. That is to say, the growth at first extends from the breast to the subareolar plexus and blocks it by permeation. Next the process extends to the tributary lymphatics running from the skin to the subareolar plexus. Lastly, as a result of lymph stasis from permeation, œdematous hypertrophy of the papillæ is seen and nutrition fails in an area of the overlying epidermis.

It is possible, of course, to conceive of the process reversed, and to assume that it spreads more rapidly once it reaches the subareolar plexus. But the permeation of the lymphatics of the dermis cannot possibly be the result of the changes in the epidermis. For the cells contained in these permeated lymphatics are not cutaneous cells, but cells originating from the mammary epithelium. For this reason I am entitled to conclude that the changes in the epidermis are secondary to the permeation of the dermal lymphatics, that the "eczema" is secondary to a pre-existing carcinoma.

A third possibility remains, that the dermatitis and the permeation of the dermal lymphatics are independent events. If so, how comes it that the areas are concentric? At either edge of the circles permeation of the dermal lymphatics is seen extending under œdematous skin just beyond the edge of the eczematous area. If this is chance, books of logic might as well be burnt.

In this case the eczema had been present for four months only, whereas the average duration of the disease at the time of operation is something more like four years, ample time for the fibrotic processes to destroy the lymphatics and obliterate all evidence of pathogenesis. It is probably useless to look for permeation in the skin if the eczema is of long standing. Those who would ask for evidence of permeation in every case of Paget's disease—who demand it to be shown in every case of a large series—fail to appreciate that disease is a biograph film and not a static entity, and that only one picture on the film, one page torn from the novel, can be fixed and examined in any one case. In most cases the picture or the page is inconclusive or insignificant. Sometimes it reveals the essential secret.

The evidence of this case does not stand alone.

A figure of Wickham's[7] (Plate ii., Fig. 2) almost duplicates the specimen I have just demonstrated. It shows permeation extending under normal epithelium, while beneath the eczematous areas are permeated lymphatics distended by proliferated cancer cells, running vertically upwards into the papillary zone of the dermis. Wickham appears to have considered that the epithelial masses were down-growing processes of the epidermis. His figure proves the incorrectness of this view, for the largest of these masses, though it touches the under surface of the epidermis, is sharply defined from it.

Duhring and Wile found in the middle and lower layers of the corium alveoli of varying size, some of them "linear" containing typical carcinomatous epithelium. These were present in both the cases they examined; and their observation distinctly points to permeation of the dermal lymphatics. It is the more important in view of the general accuracy of their histological descriptions.

I have also found evidence of persisting permeation in the deeper layers of the dermis in several cases of Paget's disease.

Pathological Picture of the Disease.

If the early specimen I have submitted to you be taken as the key and starting-point, the various isolated, otherwise unintelligible, phenomena of Paget's disease fall into their places like pieces in a jig-saw puzzle. Let me briefly picture the pathology of the disease in the light thus afforded.

A carcinoma starts in the smaller ducts of the breast, perhaps exceptionally from the acini or the larger ducts. Usually, without producing a palpable tumour, it permeates the breast lymphatics widely. The rich plexus of lymphatic vessels around the ducts forms an especially easy and convenient channel for permeation, and the lymphatic block extends along them to the subareolar plexus beneath the nipple.

The cutaneous lymphatics about the nipple are now dammed up so that lymph cannot return from them. Later they are themselves permeated, but possibly this is not always the case. At this stage, and before any lump has appeared in the breast, the skin of the nipple and the mucosa of the ducts begin to show changes dependent upon lymphatic obstruction. The epithelium shows disintegration and degeneration of its superficial layers with proliferation of the deeper layers. These changes are nutritional and non-malignant. The dermis becomes thickened by solid lymphatic œdema. The lymphatics of origin in the superficial layer of the dermis may be found filled with cancer cells, which are also to be seen in the lymphatics of the subareolar plexus.

The permeated lymphatics now undergo the usual process of perilymphatic fibrosis; they become surrounded by aggregations of inflammatory round cells, and later by young fibrous tissue, which contracts upon and destroys the included cancer cells. In most cases at the time the disease is removed the destruction of the cancer cells has been consummated, and there is seen merely a band of round-celled infiltration in the superficial dermis, while in the deeper dermis perivascular aggregations of round cells indicate the destruction of the lymphatics which are known

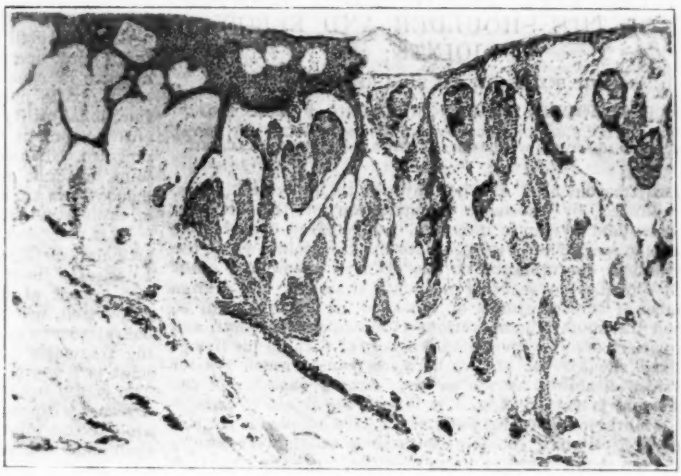
[7] Wickham, Louis: Maladie de Paget, Paris, Masson, 1890.

to accompany the blood-vessels in this layer. In other and later cases organisation into fibrous tissue is complete, round cells have disappeared, the papillæ have been destroyed by the fibrous contraction which has taken place in them, and nothing remains to show that the lymphatic vessels of the dermis have been obliterated and replaced by fibrous cords save and except the persistent changes in the epithelium and the œdematous thickening of the dermis.

In regard to the changes in the large ducts, these are evidently similar in nature to those found on the surface of the nipple, and they depend upon the same cause—namely, lymphatic obstruction from permeation and subsequent fibrosis. The only difference is that the shed epithelium cannot get away, and it remains *in situ*, plugging and distending the ducts with a degenerate mass of débris.

Lastly, even in the rare cases where, though the Paget's disease has lasted many years, yet no carcinoma has made its appearance, it is probable that an atrophic scirrhus, which may have undergone partial or complete cure, preceded the onset of the Paget's disease. But the possibility that the lymphatic obstruction in such cases is of inflammatory origin, and due to a chronic lymphangitis, cannot be altogether excluded.

FIG. 1.



Vertical section through the edge of the area of Paget's disease showing the lymphatics of the dermis permeated and distended by cancer cells derived from the subjacent carcinoma. (Magnification 63 times.)

TREATMENT.

It is sometimes stated, and more often thought, that pathology is no occupation for a serious-minded surgeon. If this is true no sportsman should study the habits of his game. Disease is the surgeon's quarry, but he should walk it up casually by clinical observation or get it driven by pathological beaters. The history of the treatment of Paget's eczema supplies a criticism of this theory. Even so distinguished a man as Sir James Paget, led astray by superficial appearances and confessedly ignorant of its pathology, advocated a radically unsound method of treating the disease which he described so well. He advised free excision of the eczematous area of the nipple, a natural step to take if the eczema were in truth the precursor and cause of the cancer. He admitted his want of success in preventing the development of cancer.

Though, as the result of Thin's work, opinion has gradually turned in favour of treating such cases as ordinary carcinomata, a remaining doubt has often led to a dangerous delay and to the adoption of half-hearted measures. If it is once generally admitted that Paget's eczema is not the possible cause of a future carcinoma of the breast, but the result of an existing one—if, moreover, it is accepted as evidence that the growth has already widely permeated the breast—even though no palpable lump can be felt in it—then there will be no excuse for dilatory methods.

The right treatment for Paget's disease is the usual complete operation for cancer of the breast. It is my impression that duct-carcinoma, the form of disease connected with Paget's disease, has a rather more favourable prognosis than carcinoma of the breast in general, and that it affects the axillary glands rather late. Surgeon-General Lenthal Cheatle tells me that, in his opinion, the post-operative prognosis of Paget's disease with carcinoma is a favourable one. The disease is so rare that statistics on the point are not available.

FIG. 2.

Horizontal section through the apices of the papillæ in the area of Paget's disease. Each papilla shows a central lymphatic permeated by cancer cells. (Magnification 110 times.)

CONCLUSION.

It has been said that the ultimate test of a theory is its fruitfulness. I may be permitted a certain satisfaction if—as I believe this lecture shows—the permeation theory of dissemination has emerged successfully from this final test.

I have to thank Dr. Browning, director of the Bland-Sutton Institute of Pathology at the Middlesex Hospital, for his kindness in placing the resources of the laboratories at my disposal for the purposes of this lecture, and for his suggestions as to methods of lymphatic injection. Surgeon-General Cheatle has kindly allowed me to use his histological specimens.

In conclusion, Sir, may I take this opportunity of thanking you, as representing this College, for the unsought recognition of my work implied in the recent grant to me of the quinquennial Walker prize for cancer research, an encouragement which has led me to present to you my views on Paget's disease.

THE TREATMENT OF

SEVERE INFECTED GUNSHOT INJURIES OF THE SHOULDER AND ELBOW JOINTS;

EARLY EXCISION TO SECURE MOBILITY.*

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THE treatment of gunshot injuries to important joints, complicated by extensive comminution of the articular surfaces and by septic infection, has received considerable attention, particularly in regard to the knee-joint, where the anatomical conformation of the synovial membrane offers such difficulty in securing adequate drainage. In a large number of severe injuries of the knee the best that can be hoped for, short of amputation, is an ankylosed joint, and the patient is left with a good prospect of earning his living. A fixed shoulder or elbow, however, causes much greater physical disability as far as the earning capacity of the individual is concerned, and it is with the object of obtaining a movable and useful joint that I have adopted a method of early excision of the joint with such satisfactory results that I am tempted to put them together, with the hope that they may prove of assistance to others.

The ultimate results obtained in the earlier period of the war after extensive injuries of both the shoulder and elbow joints were by no means satisfactory, drainage of the joint resulting in fixation of the articular surfaces, whilst sinus formation from necrosing fragments of bone often necessitated further operative measures before healing was obtained. Fixation of the shoulder, with inability to abduct, flex, extend, or rotate the arm, is a serious disability, whilst in the elbow any fixation at an angle about 80° renders the arm useless for feeding, whereas an elbow fixed at this angle is of very limited use for mechanical purposes. In my earlier cases I considered it advisable to leave the joint alone after free drainage and removal of any obviously loose fragments of bone until firm healing was obtained and then proceeded to a formal excision of the joint, but I found so much matting and infiltration of the ligaments, muscles, and structures in immediate relation to the joint from the previous septic inflammation, that not only was the operation rendered difficult, but the results obtained were not satisfactory. In addition, the time occupied in the healing of the original wounds, the liability to localised necrosis requiring local operations, and the pain experienced were a severe tax on the patient's strength, and he was often inclined to refuse further operative procedure.

In reviewing a large number of cases of gunshot wounds of the shoulder and elbow joints they may be roughly classified as: (1) Penetrating wounds without fracture or sepsis; (2) penetrating wounds without fracture but with sepsis; (3) fracture of the articular surfaces without sepsis; and (4) fracture of the articular surfaces with sepsis.

Each of these classes may be further complicated by the presence of a bullet or metal fragment, either embedded in the ends of the bone, in the joint, or in the tissue surrounding the joint. In the majority of cases the bullet or fragment conveys infection with it from particles of earth or clothing accompanying it, and the question of removal must be decided upon in each individual case from the amount of trouble caused.

The treatment of the joint depends as much upon the degree of sepsis arising as upon the anatomical injury produced. Where no sepsis is present in the joint the wounds of entry and exit may be excised but not sutured, the joint fixed on some suitable splint and treated on general surgical lines. Personally I must say that I regard the excision of primary gunshot wounds of a limited or even doubtful advantage, and have seen many cases of bad results from this practice. Where septic infection has been conveyed to the interior of the joint more active measures must be adopted, and the joint cavity thoroughly irrigated.

I would here note the difficulty in determining the presence of septic infection within the joint. It has been frequently observed that the joint may be distended with pus containing streptococci, coliform organisms, and bacillus perfringens, but yet there is comparatively little pain, and the temperature and pulse-rate are only slightly raised—in fact, a very different clinical feature to the acute septic arthritis of civil practice. With a gunshot wound penetrating a joint, one may be tempted not to open the joint in the absence of constitutional disturbance, whereas delay where sepsis exists may make all the difference in the ultimate functional utility of the joint. An inflamed area around the entrance or exit wound, the discharge of thin mucoid fluid on pressure, commencing thickening of the tissues around the joint, a slight elevation of temperature and a commencing leucocytosis are indications of infection and of the necessity of exploration and irrigation.

It is, however, to cases of extensive bony injury to the articular surfaces, associated with a virulent infection, that I desire to draw attention. These injuries are so extensive and appear at first sight so hopeless that the limb may be amputated, whereas if saved at the expense of a prolonged convalescence after free drainage and the removal of necrosing fragments of bone, the resulting fixation of the injured joint is a source of great physical disability to the patient. The septic infiltration of the tissues surrounding the joint, together with the filling up of the actual fossæ in the bone around the joint by callus during the period in which the limb must be kept at rest, all tend to prevent mobility, whilst the erosion of the articular cartilage in the pathological processes leads to absolute bony fixation.

I was faced with this difficulty in a case of a young soldier whose right arm had been amputated immediately below the shoulder-joint, and whose left elbow-joint was extensively smashed and septic. In this case fixation of the elbow at such an angle as to allow him to feed himself would have left him with an arm of little use for any other purposes, whilst fixation at 120°-150°, to give him the greatest mechanical advantage in the limb, would have rendered it useless for feeding. After much consideration I decided to freely excise the damaged elbow-joint, even in the presence of marked sepsis, leaving the cavity freely open, and after three months this patient could flex and extend his elbow to a range of nearly 90°, and had excellent muscular power in the arm—in fact, he surprised us by lifting and flexing the elbow whilst holding a heavy scuttle of coals. This case gave me much food for reflection, and I have since adopted the principle which I now advocate—namely, free and early excision in cases involving severe comminuted fracture of the articular surfaces of bone, complicated by septic infection with the direct object of obtaining a movable joint.

The Treatment Adopted.

Cases are received at Woolwich at varying periods from the date of injury, but it is no uncommon thing for them to arrive within three days of being wounded. In all septic cases I make a routine practice of giving an injection of a mixed polyvalent streptococcus and proteus vaccine, as I have described elsewhere,[1] and the wounded area is carefully skiagraphed to determine the nature and extent of any bony injury and the presence of metal fragments. I consider this preliminary injection of "antisepsis" vaccine of as much importance as the prophylactic injections of antitetanic serum, as by its means the spread of anaerobic infection is limited.

If the ends of the bone entering into the formation of the shoulder or elbow joint are severely fractured and if there is evidence of septic infection in the joint, I do not hesitate to open the latter freely, remove all completely detached fragments, and saw off the ends of the bone; the whole cavity is flushed with a forcible stream of hot sterile water, and after arresting the bleeding gauze is very lightly inserted into the cavity, into which are brought three or four small perforated tubes attached to a reservoir containing Dakin's solution or hypertonic saline, by which the cavity is frequently flushed. The incision is left freely open, perhaps one suture being used at the upper end. In the case of the shoulder I make use of an oblique anterior incision between the deltoid and pectoralis major muscles, opening the joint at the side of the long tendon of the biceps. Frequently the actual damage to the bone is more severe than the radiograph would indicate, the head may be completely separated from the neck and displaced.

* A paper read before the Surgical Section of the Royal Society of Medicine, March 14th, 1917.

[1] THE LANCET, 1916, ii., 859.

If possible, the tuberosities and rotator tendons are left intact, but if the fracture involves the tuberosities they are removed, the periosteum being stripped from the upper part of the shaft and the bone divided through the surgical neck. A stab incision is then made from the posterior aspect of the joint backwards to come out behind the shoulder, or the bullet track used if conveniently placed and a drainage-tube inserted, the flushing tubes being introduced by the anterior incision. The arm is then fixed in a fully abducted and slightly flexed position, and in my later cases I have made use of a special splint I have had made for me by Messrs. Allen and Hanbury for both these cases and for gunshot fractures of the upper third of the humerus, in the latter extension being maintained from the flexed elbow. The arm rests very comfortably in this splint, the wound can be easily dressed without removing it, and the patient is able to be up and walk about; the deltoid muscle is maintained relaxed and does not show the same degree of wasting as when the arm is fixed to the side.

In the elbow I use a free, median, posterior incision, separating the tissues close to the bone and as far as possible preserving the triceps tendinous attachment, and, of course, the ulnar nerve. The lower end of the humerus is projected from the wound and removed as may be found necessary, usually above the epicondylar line. The olecranon is removed together with the upper cartilaginous surface of the coronoid process and the cupped disc of the head of the radius. The cavity is then flushed with hot sterile water, lightly filled with gauze, and the irrigation-tubes introduced. The arm is put up, flexed, and supinated, the wound being left freely open. After a few days, when granulations appear on the surface, passive movements are commenced and the forearm put up in a different angle of extension each day. As the wound fills up voluntary actions are encouraged.

In two cases of severe fracture into the elbow I have been content with the removal of the fractured humeral condyle, leaving the olecranon and radius untouched. In each case the internal condyle and trochlear surface was removed at an early stage and the joint treated as in a complete excision. At the operation cultures are taken from the interior of the joint and a full bacteriological examination made, from which specific autogenous vaccines are prepared and given at intervals of four or five days, under the direction of my colleague, Dr. Kenneth Goadby, who will detail the bacteriology of the cases.

It might be noted here that the bacteriological findings in these cases show the presence of not only pyogenic cocci and bacilli of the coli group, but also bacillus perfringens of malignant œdema and *Hibler IX.* The operations in practically all the cases were done in the presence of active and virulent sepsis, but by treatment with free drainage, irrigation, and vaccines the sepsis was at once controlled. There is usually a slight elevation of temperature for a few days after operation, but it soon settles down, and in only one case have I had to incise the limb after the operation for any spread of sepsis.

Results.

So far I have operated in an early stage upon six cases for excision of the shoulder-joint, and on eight for excision of the elbow-joint in cases of severe comminution of the articular surfaces associated with sepsis.

Shoulder-joint cases.—One remains in hospital, but it is doing well; of the remaining five, in one a sinus remained after 17 weeks due to the necrosis of some small fragments which were removed. Of these five cases the ultimate result was good in two, free movement of flexion and extension and abduction without scapular movement to an angle from 50° to 60° with the vertical being obtained. In two other cases the result was fair flexion and extension being good, but abduction was limited to 40° with the vertical, whilst in the remaining one there was evidence of circumflex nerve injury from the primary wound which persisted, so that abduction was impossible owing to the paralysis of the deltoid, and the patient refused further operative treatment to deal with the nerve lesion. It is interesting to note that in cases of excision of the shoulder where extensive removal of the bone through the surgical neck was performed by subperiosteal resection, subsequent radiographs demonstrated that there was considerable reformation of bone in the line of the shaft of the humerus towards the glenoid cavity.

Elbow-joint cases.—Here the ultimate results have been even more satisfactory. Of the eight cases operated upon one is still in hospital from operation too recent to include as a result; of the remaining seven cases, one required further operation on the ninth day from spread of sepsis in the middle of the arm. Of these seven, in four the ultimate result exceeded all my expectations, flexion and extension being possible to almost full extent and supination and pronation being possible, but not perfect; all show some degree of lateral mobility, but that does not interfere with the usefulness of the limb and the muscular power in the arm and forearm is excellent. In each of these four cases, flexion of the elbow is so good that the patient can voluntarily touch the shoulder of the same side, can fix a collar-stud at the back of the neck, and can touch the angle of the scapula of the opposite side; extension is in each possible to almost a straight line. Each one could lift and raise a fairly heavy ward chair with the elbow flexed and unaided. In two cases flexion and extension are possible in a smaller range, in one from 80° to 145°, and in the other from 80° to 120°, further movement being limited by masses of callus formed about the ends of the bone. In the latter case the operation for excision was performed at a later period after free drainage had proved ineffectual to arrest the infective processes. In the remaining case, in which the upper fourth of the radius had to be removed owing to excessive shattering, flexion and extension are possible in a range of 45°, but no movement of pronation or supination is allowed owing to the absolute fixation of the upper end of the radius to the ulna by a large mass of callus joining the two bones.

In addition to the above I have excised two hip-joints for extensive fracture of the head and neck of the femur with septic infection in the joint. One case did well, and the patient walks with a limb shortened by 1¼ inches, but with good movement at the hip. The other case was doing well, but died suddenly on the thirteenth day from a profuse hæmorrhage from a chronic duodenal ulcer which opened the pancreatico-duodenal artery. So far I have had no opportunity of excising a knee-joint in a recent case of gunshot injury, but in the light of other joint cases and with my experience of the difficulty of adequately draining a septic knee-joint, I would not hesitate to do so, but in this instance with the distinct object of obtaining a firmly ankylosed joint.

I am of opinion that the earlier the operation of excision is performed the better is the chance of obtaining free mobility. In my cases the best results have followed operations performed soon after the injury. Naturally a very great deal of the success of the operation depends upon the assiduity of the after-treatment and the hearty coöperation of the patient in carrying out early movements, and I would here like to express my sincere thanks to the various medical officers who have had charge of these cases and who have so faithfully carried out my instructions.

Advantages of the Operation.

1. All loose fragments of bone and the articular surfaces are removed, having a clean sawn surface rather than jagged ends of bone.

2. Very free drainage is established, and the joint can be freely irrigated.

3 The septic processes are at once controlled and pain is much diminished. The chance of having to amputate for advancing sepsis is much lessened.

4. The time of convalescence is very much diminished and there is much less risk of localised necrosis of bone and sinus formation.

5. A movable joint is obtained with good muscular powers.

Objections to the Operation.

1. *Shock.*—There is necessarily more shock in an excision of a joint than in making free incisions for drainage, but actually the shock is very slight. The operation can be easily performed in half an hour, bleeding is easily controlled, and no large nerves are divided as in amputation. I have seen no necessity of amputation having to follow in any case from failure to control the sepsis, but, should it become necessary, the previous excision of the joint would probably increase the risk. There has been no instance of secondary hæmorrhage.

2. The fact that *freshly sawn surfaces of bone are exposed to septic infection* might seem to be a disadvantage, but with

the free drainage, intermittent flushing of the cavity, and the use of vaccines the risk of septic osteomyelitis appears to be small.

3. The risk of a *flail joint resulting*. This is a possibility which cannot be overlooked, especially in the elbow. I can only say that I have not seen it in my cases, and I have removed so much bone that three fingers could easily be placed between the sawn ends with the forearm extended, but I have seen one case in which the joint was flail after an excision of the elbow performed at a later stage.

4. The excessive formation of callus around the divided ends of the bone may limit free movement. In cases in which the comminution of bone is excessive, or where splinters or minute particles of bone are conveyed into the surrounding tissues, this formation seems to be more excessive and may limit free movement; but where movement is commenced early, and the patient steadily perseveres with it, good range of movement is obtained. In some cases it is surprising that such good movement is obtained where large masses of ossified callus surround the ends of the bone.

It may be justly urged on theoretical grounds that it is unjustifiable to remove so much bone in the presence of active and virulent sepsis, or that I am urging a procedure which contravenes ordinary surgical principles, but I can only point out the success that has attended these operations. I am conscious that the number of cases is small, but I have not included those in which the operation has been performed when the wounds were healed and the joint fixed or those in which the operation was done at a later stage when necrosis of the end of the bone had commenced. However, I feel most strongly that if in these cases of septic gunshot fractures involving the joint excision or partial excision were performed soon after the injury, we should be doing more for the wounded man in putting him into a better position to earn his future livelihood, would materially shorten his convalescence, and thus save the State not only much of the expenses during hospital treatment, but also the amounts paid in pensions.

I must thank Colonel R. J. S. Simpson, A.D.M.S., Woolwich, for permission to make use of the cases forming the basis of this communication, and my colleague, Dr. Martin Berry, for the excellent series of radiographs used in illustrating it.

Shoulder-joint Cases.

CASE 1.—Private B. Wounded Dec. 3rd, 1915. Bullet entered at back of left shoulder and passed out by a large wound in front. Operation in France; anterior wound incised and shoulder-joint opened. Jan. 3rd, 1916: Admitted to Woolwich. Free discharge from anterior wound, great pain on any movement of shoulder. Deltoid paralysed and circumflex anæsthesia. Skiagraph showed much comminution of head and neck of humerus; head of bone turned, so that articular surface faced outwards. Jan. 6th: Operation. Wound opened; upper end of humerus of dark-grey colour and articular cartilage removed. Periosteum separated and bone divided through surgical neck. Area flushed with hot saline and wound lightly packed with gauze with large drainage-tubes. Arm fixed abducted with extension from elbow. Jan. 19th: Wound granulating well. Temperature normal since operation. Arm fixed on Hey Groves crutch-splint. No pain in shoulder. Jan. 27th: General condition much improved. Feb. 14th: Wound healed. Passive movements are free, but patient will not make any attempt towards active movement. Deltoid paralysed. March 20th: Flexion and extension good. No abduction. Deltoid wasted. June 1st: Can flex and extend shoulder, but no abduction. Circumflex paralysis remains. Movements of elbow and hand good. Skiagraph showed large deposition of bone in line of shaft occupying position of piece removed. No necrosis or sequestrum seen.

CASE 2.—Private H. Wounded Dec. 12th, 1915, bullet entering at point of right shoulder and coming out in pectoral fold. Feb. 27th, 1916: Sinuses remain at each wound and dead bone easily felt by probe. Free discharge of thick pus. Skiagraph showed disorganisation of head of humerus; articular surface pointed upwards. Rarefied area in neck, probably necrotic. March 4th: Operation. Much disorganisation found in shoulder-joint, the head of humerus being blackened and soft necrotic area below it. Tuberosities not involved. Section made through anatomical neck and necrotic area thoroughly scraped. Cavity flushed out. Free drainage. Arm fixed in abducted position. March 24th: Slight pyrexia for first week. Wound closing rapidly. Passive movements commenced. April 20th: Wound healed. Moves shoulder a little. July 13th: Can flex and extend arm and abduct to 40°. Deltoid acts well. No rotation in shoulder, but movements are increasing.

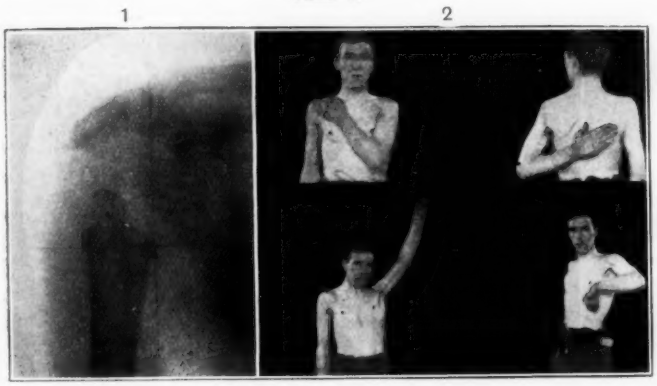
CASE 3.—Corporal G. Wounded Jan. 24th, 1916, bullet passing through right shoulder. Two operations in France where shoulder-joint opened and drained. March 17th: Two healed wounds on outer aspect of shoulder and large open wounds both in front and behind, through which a drainage-tube passes. Great pain in any movement. No paralysis of arm. Skiagraph showed extensive comminution of upper end of humerus, the head being completely separated from the shaft, the drainage-tube passing in interval. Upper end of shaft necrotic. March 28th: Operation. Anterior opening enlarged and joint opened. Head of humerus very necrosed and devoid of articular cartilage. Upper end of shaft also necrosed. Periosteum separated and shaft divided through surgical neck, 1½ inches being removed. Granulations scraped away and bleeding arrested by hot saline. Cavity irrigated with hydrogen peroxide, large drainage-tube in posterior wound and small tubes for irrigation from front wound. Light pack of gauze in wound. April 2nd: Very little discharge and granulations appearing. April 17th: Wound healthy, passive movements commenced. May 10th: Not much active movement in arm yet. July 15th: Very fair movement in shoulder, flexion and extension good, but abduction limited to 40°. Skiagraph showed a new formation of bone extending in line of shaft towards glenoid cavity.

CASE 4.—Private G. P. Wounded July 1st, bullet entering front of left shoulder 1½ inches outside tip of coracoid process and emerging at slightly lower level behind. Admitted July 5th, when a radiograph showed fracture of the clavicle, of the acromion process, and of the anatomical neck of the humerus, the head of the latter being comminuted and displaced. July 6th: Wounds opened and free drainage established through joint. July 27th: Temperature raised for last three days and local swelling about shoulder. Wound opened and head of humerus found blackened and necrosed. Decided to excise head; periosteum peeled back and muscular attachments to tuberosities detached. Resection through upper part of surgical neck. Joint cavity flushed with hydrogen peroxide and saline and freely drained by posterior incision. Intermittent flushing with Dakin's solution. Arm maintained abducted. Sept. 25th: Wounds all healed. Nov. 12th: Can voluntarily abduct arm to 45° from body, and on fixing scapula passive movement can be made to 80° before scapula rotates. Flexion and extension of arm good. Skiagraph showed a fair growth of callus around upper end of shaft. Glenoid irregularly thickened. Jan. 4th, 1917: Movements at shoulder are more free. Can abduct easily to 60° without rotation of scapula. Flexion and extension are more free. Result excellent. (See Figs. 1 and 2.)

CASE 5.—Private H. MacI. Wounded July 1st, 1916, by rifle bullet entering in front of right shoulder just outside tip of coracoid process and emerging in posterior deltoid margin. Admitted July 4th. Anterior wound sloughing. Thin, serous bubbly pus draining. Great pain in shoulder. No nerve injury. Skiagraph showed very comminuted fracture of head of humerus. Articular surface rotated. July 6th: Operation. Incision in pectoro-deltoid interval, joint opened. Head of humerus much comminuted. Upper end of shaft black and necrotic. Periosteum stripped off tuberosities and detached bone and upper end of shaft removed. Area flushed with peroxide and hot saline and cavity lightly packed with gauze. Large drainage-tube through posterior wound. Arm put up fully abducted and arranged for frequent flushing. July 9th: Temperature about 100° F. Wound clean and commencing granulation. July 20th: Wound excellent. Very little discharge. August 22nd: Arm removed from splint and passive movements commenced in shoulder. Wound almost healed. Nov. 11th: Small sinus remained in incision and skiagraph showed small sequestra at upper divided end of humerus. Can move shoulder surprisingly well. Can abduct to 45° without movement of scapula. Nov. 13th: Sequestra removed. Jan. 10th, 1917: Wound healed. Movements of arm increased. Can abduct to 60° and flex and extend well. Can passively raise arm to almost vertical. Result is very good. (See Figs. 3, 4, and 5.)

CASE 6.—Corporal E. Wounded July 29th, 1916, by shell fragment entering posterior aspect of left shoulder and emerging at tip of coracoid process. Admitted August 3rd. Patient sallow and sweating. Temperature 98° F. Pulse 112. Wounds foul and fine crepitation felt around anterior aspect of shoulder. Skiagraph showed great comminution of head of humerus, which is separated from shaft. Glenoid cavity and neck of scapula comminuted. Fracture of coracoid process and spine of scapula. Three fairly large metallic fragments present. Operation (on admission): Wound freely opened and direct communication made from front to back through joint. Bone very comminuted and very foul. Smear preparations showed numerous spore-forming bacilli. Area swabbed with peroxide and tubes arranged for continuous

CASE 4.

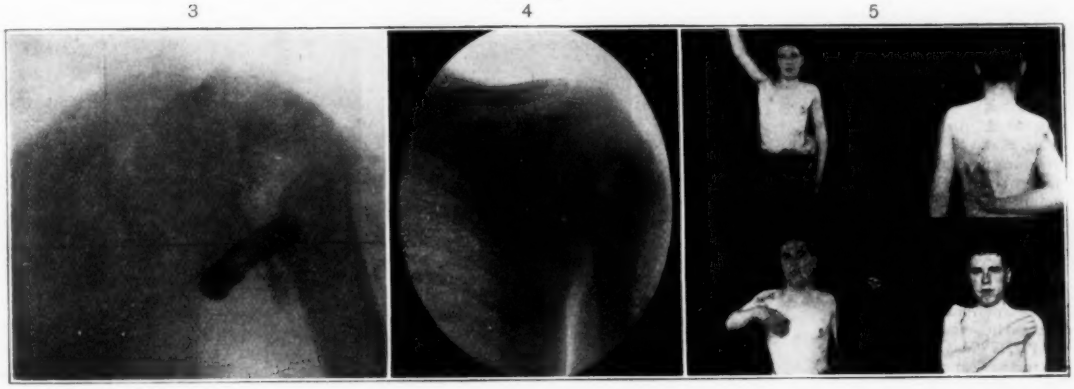


FIGS. 1 and 2 (Case 4).—Fig. 1, radiograph taken three and a half months after excision of shoulder, shows the ossification of callus at the upper end of shaft of humerus. Fig. 2 shows the movements obtained; note that the figure showing elevation of the arm is a passive movement, the others active and voluntary.

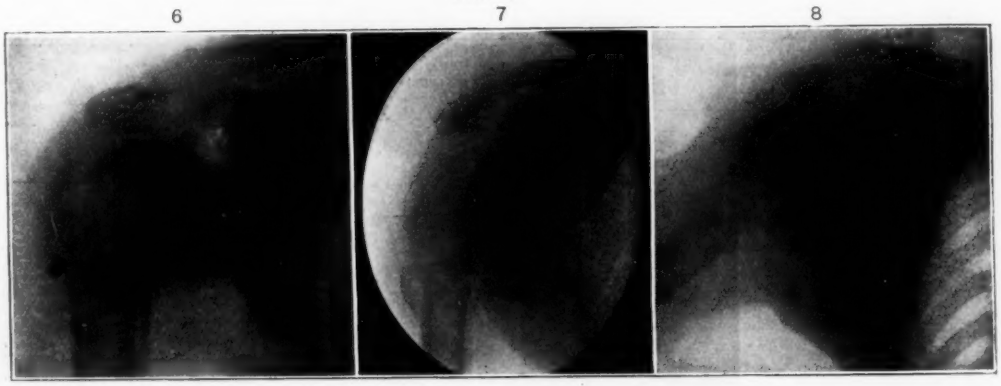
FIGS. 3, 4, and 5 (Case 5).—Fig. 3 is a radiograph of the original injury to the head of the humerus with drainage-tube *in situ* (July 4th). Fig. 4, radiograph four months after excision. Fig. 5, the movements obtained; note that the elevation of the arm is a passive movement, the others active movements.

FIGS. 6, 7, and 8 (Case 6).—Fig. 6 shows the injury to humerus, scapula, and clavicle five days after the receipt of wounds, the central clear area being a gaseous collection in anaerobic infection. Figs. 7 and 8 are radiographs taken two months after excision showing the movement of the mass of callus with the humerus.

CASE 5.



CASE 6

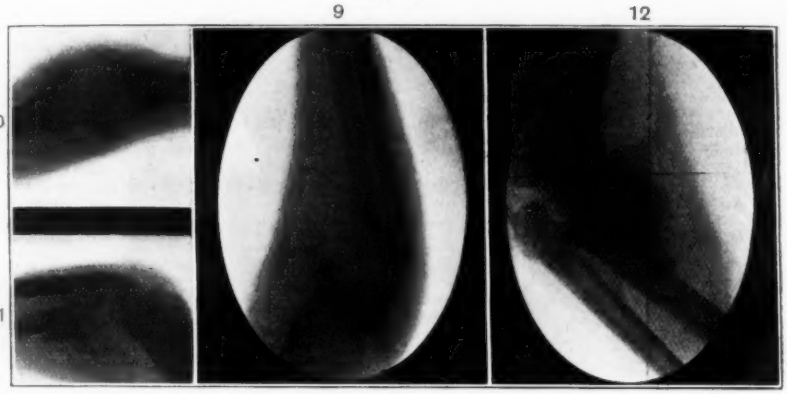


irrigation. Saline infusion. August 6th: General condition good. Temperature 98·6° F. Pulse 96. Tongue clean. August 14th: Condition unsatisfactory. Temperature up to 102° in evenings, but tongue moist. Drainage not so free. August 15th: Operation. Wounds freely opened. Bone found blackened and very foul. Much comminution. Purulent granulations in medullary cavity of shaft. Latter sawn through surgical neck. Glenoid cavity only held by triceps attachment and was removed, and many rough pieces of bone removed with forceps. Area flushed with saline and hydrogen peroxide and freely drained. Arranged for continuous irrigation and arm put up abducted. August 21st: Temperature normal since operation. August 30th: Doing well. Arm maintained abducted to 60°. Sept. 20th: Anterior wound healing well. Oct. 20th: Skiagraph showed a lot of callus around upper end of humerus which moves with shaft. Sequestra present at glenoid and upper end of shaft. Dec. 30th: Sinuses remain at each end of incision. Jan. 9th, 1917: Sinuses opened and sequestra removed. There is a small amount of mobility at shoulder, and deltoid muscle acts. Patient remains under treatment. (See Figs. 6, 7, and 8.)

Elbow-Joint Cases.

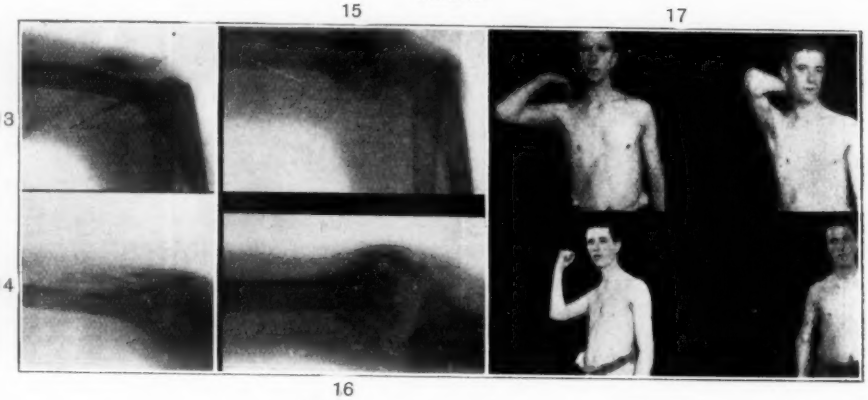
CASE A.—Private O. Wounded May 28th, 1915, by shell explosion in close proximity, causing extensive wounds in right arm and about left elbow. Was operated upon within two hours and right arm amputated immediately below shoulder-joint. Admitted June 5th. Amputation stump very septic, wound extending into posterior axillary fold. Also septic wound of upper left forearm over olecranon. Skiagraph: Complete shattering of upper 2 inches of both radius and ulna; very comminuted. No fracture of humerus. Large metallic fragment 3 inches above joint. June 8th: General condition bad. Pulse 120. Saline enemata. Wound of forearm opened for drainage and fragment removed. June 14th: Operation. Vertical median posterior incision and triceps

CASE A.



FIGS. 9, 10, 11, and 12 (Case A).—Fig. 9 shows the great comminution of upper ends of radius and ulna, with fragments of bone driven into tissues in front of joint. Figs. 10 and 11 show antero-posterior and lateral views of the joint six months after operation (Fig. 11 is upside down). Fig. 12, skiagraph after 18 months. The large mass of callus in front of joint limited range of movement to 60°, but flexion was allowed to a right angle.

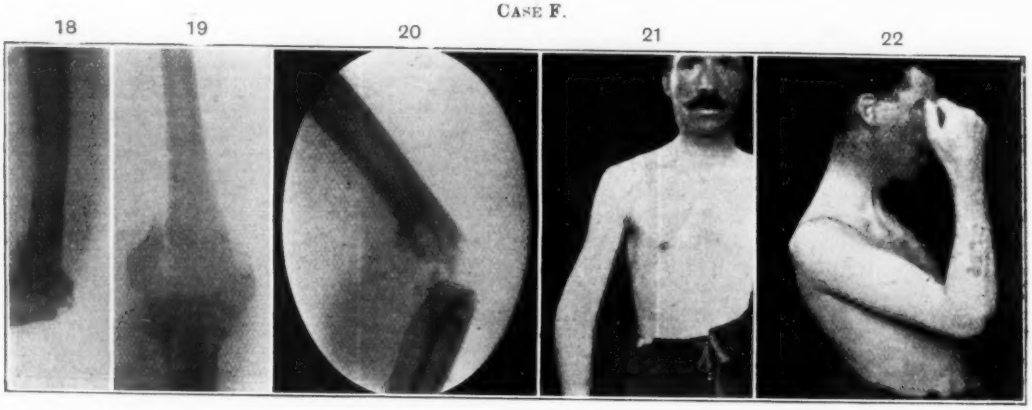
CASE E.



FIGS. 13-17 (Case E).—Figs. 13 and 14 are lateral and antero-posterior radiographs taken four days after injury. Figs. 15 and 16 are taken ten weeks after excision of elbow; note lateral formation of callus and slight internal displacement of forearm. Fig. 17 depicts the voluntary movement obtained.

FIGS. 18-22 (Case F).—Figs. 18 and 19 show the fracture five days after injury; note the comminution of lower end of humerus. Fig. 20, six weeks after excision. Figs. 21 and 22, voluntary movement six weeks after excision; these movements increased in range to those in Fig. 17 (Case E) after a further interval of seven weeks.

CASE F.



tendon detached. Detached fragments of bone removed and upper ends of radius and ulna sawn off just above the level of tubercle of radius. Humerus not sawn off. Area flushed with peroxide and cavity lightly packed. No sutures in wound. June 20th: Wound clean and granulating. July 2nd: Passive movements commenced in elbow. Can move fingers and hand well. August 2nd: Wound almost healed. Only a small range of movements allowed without pain. Jan. 31st, 1916: Can move elbow through a range of 80° and has very good muscular power. Can feed himself and touch back of occiput. There is a firm prominence in front of elbow. December: Elbow had improved until he was again injured by bomb explosion. Still has a range of movement of 60° and power is very good. Skiagraph showed large formation of callus about upper end of radius and ulna which prevents full flexion at elbow. (See Figs. 9, 10, 11, and 12.)

CASE B.—Private E. M. Wounded Sept. 25th, 1915. Wound in upper left forearm, involving median nerve, and also in inner aspect of right elbow-joint. Admitted Oct. 14th, when there was great pain in right elbow, tense swelling around the joint, and a thick purulent discharge from the wounds. Temperature 103·4°F. Skiagraph showed shattering of lower end of right humerus. No fracture of ulna or radius. Oct. 15th: Operation. Wounds of right elbow opened and found to pass directly into elbow-joint, the inner part of which was destroyed. Completely detached fragments of bone were removed, including the whole of inner condyle and supracondylar ridge and the trochlear surface of humerus. Capitellar surface was intact. Rough bone edges were rounded off and cavity flushed with hot saline and with peroxide. Wound very lightly filled with gauze. Arm put up on right-angle anterior splint. The operation wound very quickly cleaned up and granulated. Jan. 1st, 1916: Wound healed and movements of elbow are good. Jan. 27th: Can voluntarily move elbow from 80° to 160°. The ulna has become slightly displaced inward as the result of the removal of the inner half of humeral articulation, but movement and muscular power are quite good.

CASE C.—Private M. Wounded Sept. 25th, 1915, in left forearm, fracturing radius in upper third and also on inner aspect of right elbow-joint. Arrived Oct. 15th. From the wound of right elbow there was a profuse purulent discharge; it was much swollen, extremely painful, and temperature 103° F. Skiagraph showed an extensive comminution of lower end of humerus into elbow-joint. Radius and ulna were intact. Oct. 16th: Operation. Wounds opened and passed directly into elbow-joint; the inner condyle of humerus was shattered. All loose bone removed, including the whole of trochlear surface of humerus, internal condyle, and part of the internal supracondylar ridge. The capitellar surface was left, together with the olecranon and head of the radius, which were not fractured. All rough edges of bone chipped away, cavity flushed with hot sterilised water and hydrogen peroxide. Gauze lightly packed in and two small tubes passed in for intermittent flushing. Oct. 27th: Elbow maintained flexed. Wound clean and granulating. Nov. 23rd: Wound nearly healed. Passive movements in elbow good. Jan. 1st, 1916: Wound of elbow healed. Can flex voluntarily to 75° and extend to about 150°. June 27th: Movements of elbow from 70° to 150°. Muscular power is very good. Ulna is slightly displaced inward.

CASE D.—Sergeant S. Wounded April 21st, 1916, shell fragment striking on tip of olecranon of right arm. Operation in France, where large metal fragment and several pieces of bone removed. On admission on May 1st there was a rounded opening over point of olecranon where bare fragments were exposed. No exit wound. Elbow very painful, and there was undue mobility forward of joint. Temperature 99° F. Skiagraph showed whole of olecranon comminuted into small fragments. Fracture of lower end of humerus separating internal condyle and trochlear surface from rest of bone, extending into joint and displaced slightly forwards. May 6th: Operation. Vertical posterior incision through triceps. Many small fragments of olecranon removed and pus found in joint. Base of olecranon sawn through. Humeral fracture was in good position and so a complete excision was not performed. Counter opening made on outer side and tubes arranged for continuous irrigation. June 8th: Temperature gradually settled down. Very little movement allowed in elbow. July 6th: Has had a lot of pain in elbow and œdema around it. Temperature 99-100° F. July 8th: Operation. Incision reopened and lower end of humerus found to be necrotic. Further opening on inner side and joint irrigated. July 20th: Temperature 101° and much purulent discharge. Operation. Joint fully opened and cartilage found much eroded. Complete excision removing humerus above intercondylar line, base of olecranon, and head of radius. Light pack of gauze and small tubes for irrigation. August 1st: Doing well, wound clean. Temperature normal. August 30th: Wound healed. Can voluntarily flex elbow. Sept. 20th: Can flex and extend from 80° to 120°. Supination and pronation fair. Oct. 30th: Much improved. Can touch shoulder of same side. Supination and pronation improved. Muscular power good.

CASE E.—Private F. Wounded July 1st, 1916, by bullet entering outer and anterior aspect of right arm 2½ inches above elbow and out over external condyle. On admission, July 5th, both wounds were inflamed and surrounding tissues swollen. Great pain in moving elbow. Temperature 98·6° F. Skiagraph showed fracture of lower end of humerus, extending into joint. Much comminution, especially of external condyle. Radius and ulna intact. Several small pieces of bone in tissues in front and behind joint. July 9th: Elbow very painful. Temperature 99·6°. Leucocyte count 13,500. July 11th: Operation. Median vertical incision and pieces of bone removed from triceps. Joint freely opened and fracture found much more extensive than radiograph suggested, the whole of external condyle and capitellar surface and outer half of trochlear surface being completely detached, comminuted, and rotated outwards. Section of humerus made ¾ inch above upper limit of olecranon fossa and olecranon removed at base, leaving cartilage of coronoid process and head of radius intact, owing to the extent of removal necessary in humerus. Cavity flushed with hot water and upper part of incision and triceps sutured. Free opening left below and tubes put in for intermittent flushing. July 20th: Spread of sepsis in arm. Focus opened. July 24th: Temperature not raised since last operation. Passive movements commenced. Wounds clean. August 23rd: Wound almost closed. Voluntary movements increasing. Sept. 8th: Wound healed. Can flex elbow enough to feed himself and to light a cigarette. Sept. 20th: Can voluntarily flex to 80° and extend almost fully. Supination and pronation very good. December: Can flex to 75° and extend almost to straight line. Muscular power very good. Excellent result. (See Figs. 13, 14, 15, 16, and 17.)

CASE F.—Private A. M. Wounded July 29th, 1916, bullet entering over tip of right olecranon and emerging at side of inner mid-line of elbow-joint. On admission, August 3rd, there was much ecchymosis of arm and forearm and swelling around the elbow-joint. Wounds small and clean. Temperature 98·4° F. Movements of elbow painful. Skiagraph showed very extensive damage to lower end of humerus, both condyles being fractured from shaft into joint and separated by lower end of shaft. Olecranon process also fractured. August 6th: Joint more swollen. Temperature 99·8°. Leucocyte count 15,000. August 7th: Operation. Posterior wound excised. Vertical median posterior incision of joint opened. Olecranon found fractured, together with a large triangular piece of upper shaft of ulna, which was removed. Both humeral condyles detached and articular surface of humerus comminuted, the lower end of shaft impinging on ulna between the fractured condyles. The muscular attachments were separated from condyles and later removed and lower end of humerus sawn off. Olecranon and coronoid processes of ulna and head of radius removed. Area well flushed with hot water and bleeding arrested. Each end of wound sutured and large median opening left for irrigation tubes. August 14th: Temperature normal since operation. Very little discharge. Small drainage-tube only in cavity. August 21st: Wound granulating. Passive movements begun. Sept. 12th: Can voluntarily flex elbow to 90°. Sept. 29th: Movements increasing, but muscular power poor. Nov. 20th: Movements very much improved. Can easily touch shoulder of same side, back of neck, and scapula of left side. Can extend to practically straight line. Can supinate but cannot completely pronate. Some lateral movement in elbow. Muscular power good. An excellent result. (See Figs. 18, 19, 20, 21, and 22.)

CASE G.—Private E. A. Wounded Sept. 10th, 1916, bullet passing through upper and outer part of right forearm just below elbow-joint. Admitted Sept. 27th. Wounds dirty and swelling about upper arm. Great pain on any attempted movement of elbow. No nerve injury. Skiagraph showed a very comminuted fracture of head, neck, and upper shaft of radius. Many small pieces of bone driven into surrounding tissues. No fracture seen in ulna or humerus. With such a comminution of radius and with sepsis in the elbow-joint, I deemed it advisable to remove the upper end of radius and so ensure drainage and also to attempt to obtain mobility in the elbow. Sept. 29th: Operation. Vertical incision through posterior wound. Radial head found loose and in small pieces, the articular ligament being destroyed. Many completely separated pieces of bone were removed and the sharp upper end of shaft of radius cut off with forceps. The elbow and superior radio-ulnar joints were fully exposed and flushed with hot saline and with hydrogen peroxide. Area lightly packed with gauze with tubes for drainage. Oct. 20th: Wounds granulating well. Temperature normal. Dec. 14th: Wounds healed. Can voluntarily move elbow from 75° to 120°, and this will probably further improve. There is no movement of pronation or supination and a skiagraph shows a large mass of callus around the upper end of the radius, fixing it to ulna, which now shows a small linear fracture in same area. Probably the excessive formation of callus is due to the great comminution of bone forced into the tissues by the "explosive" force at the original injury.

CASE H.—Lieutenant P. P. Wounded Sept. 15th, 1916, by shell fragment on inner and posterior aspect of right elbow. Has had five operations in France, but does not know what was done. Admitted Nov. 14th, when arm and forearm fixed in a straight Thomas splint, with extension. There was a large granulating surface on inner and posterior aspect of right elbow and much loss of tissue. Complete ulnar anæsthesia and paralysis. Skiagraph showed internal condyle of humerus was missing and a fracture-line through humeral articular surface separating trochlear from capitellar surface. Olecranon was fractured at base and displaced, and there was much bone débris in tissues. Nov. 20th: Temperature has been raised and more swelling around joint. Wounds opened and articular surface found devoid of cartilage, roughened and eroded. Counter openings made for free drainage. Dec. 12th: Skiagraph showed necrosis was extending. Dec. 15th: Operation. Vertical median posterior incision. Olecranon removed. Humerus projected from wound and 1½ inches of lower end removed, but not up to limit of fracture-line on inner side. Upper end of ulna and radius was necrosed, and so removed by saw through base of coronoid process and head of radius. Bleeding arrested and area well flushed with hot water, and tubes arranged for intermittent flushing with Dakin's solution. There was 1¾ inches interval between sawn surfaces when forearm extended. Dec. 20th: Temperature normal since operation. Wound flushed very frequently with Dakin's solution, alternating was hypertonic saline. Dec. 27th: Wound granulating rapidly. Temperature normal. Forearm fixed in different positions at daily dressing. Jan. 12th: Granulations flush with surface and much smaller. Can move elbow passively from 75° to 120° without pain. March 1st: Can voluntarily flex from 150° to 90°. Remains under treatment.

ON THE CULTIVATION OF THE MALARIAL PARASITE *IN VITRO*.*

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IN the course of an investigation during the months of September and October, 1916, of cases of pyrexia admitted to a casualty clearing station as N.Y.D. (not yet diagnosed), malaria, or jaundice, the usual methods of hæmoculture in bile-salt media and citrated broth were supplemented, in addition to the examination of blood films for malaria, by the employment of a medium consisting of citrated normal saline containing varying strengths of glucose. The object in view was the cultivation of the plasmodium in this medium. At first the strengths of glucose used were 2 and 5 per cent., and later two other strengths, 7·5 and 10 per cent., were tried. The strength of the sodium citrate in the medium was 1·5 per cent.

The cultivation of the parasite was attempted in every instance of 100 cases of pyrexia, comprising enteric group infections, 20; N.Y.D., 49; and malaria, 31. In this first series a marked increase in the number of parasites in the culture tubes was noted in 9 of the 31 cases of malaria. The present paper embodies the results obtained from 51 cases of clinical malaria examined by means of the following technique.

Technique.—Blood from a vein at the bend of the elbow was obtained either by direct puncture or by an all-glass syringe with large-bore needle. About 1 to 2 c.c. of blood was inoculated into 10 c.c. of the glucose medium. After thorough mixing the tubes were incubated at 40°C. for 20 to 24 hours. Both aerobic and anaerobic methods were employed. Films were made from the uppermost layer of corpuscles, after the supernatant fluid had been pipetted off. Stained by the Giemsa method and examined by oil-immersion lens. The control films of 51 cases showed:—

Malignant malaria (ring forms and crescents or crescents only)	18
Benign tertian	12
Quartan	1
Malaria, type undetermined	10
No malarial parasites	10

Culture.

	Increase of parasites.			Totals.	
	Marked.	Not marked.	Undetermined.	Positive.	Negative.
Malignant malaria	11	1	2	14	4
Benign tertian ...	0	0	1	1	12
Malaria, ? type ...	4	0	3	7	3
Films negative ...		2	1	5	5
	17	3	7	27	24

Evidence of increase of parasites.—Using this medium, a diluted plasma with the addition of dextrose, the characteristic form which can be recognised as a plasmodium is what is termed here the "dot" form. In size it is smaller than the fine ring, the nucleus staining as a bright-red dot and the protoplasm an intense blue, semilunar in shape. The appearance suggests the merozoite. Typical ring forms were infrequent. Although the "dot" form appears free in many of the films, yet in fortunate films they are seen to be intracorpuscular, and it is probable that in the spreading of the films the fragile envelope of the incubated red corpuscle is damaged. No comparative enumerations of parasites were attempted.

Remarks.—In 17 cases (all of which were undoubtedly malignant malaria) the terms "abundant," "very numerous," are employed to indicate the number of "dot" forms present. The mere words do not adequately convey to the mind the relative ease with which parasites are to be found in the films as compared with the original control film. Of 18 cases of malignant malaria investigated only 4 gave a completely negative result in culture. On the other hand, no increase of parasites could be demonstrated in 12 cases of benign tertian and in 1 of quartan infection. Of 10 cases of malaria of undetermined type the culture was negative in 3. A reference to this point in connexion with diagnosis and the presence of quinine in the serum will be made later. Of 10 cases, 9 of clinical malaria and 1 of jaundice, in which the control blood films after adequate examination were considered negative, "dot" forms were found in 5. In two instances they were abundant.

Our statement that no parasites were found was the result of prolonged examination of blood films. The whole question, however, of the number of parasites present in blood is dealt with in detail by Sir Ronald Ross in his text-book on the "Prevention of Malaria" (1911), but one sentence can be quoted from this work, as follows: "But for a broad general rule we may, I think, accept the principle (pending more exact researches) that if we cannot find the parasites after careful search their number is not usually sufficient to produce fever."

Interpretation of results.—Two interpretations of this apparent increase of parasites seem possible: (1) an actual increase in the number of parasites, and (2) an apparent increase due to a concentration effect. To take the latter explanation. As is well known, if citrated whole blood be centrifugalised or allowed to settle the leucocytes are found to occupy mainly the intermediate layer between the red blood cells and the supernatant fluid. And yet it is in this intermediate layer that the malarial parasites are found. To quote Bass[1]: "The parasites live at the top of the column of the precipitated cells in a layer varying in thickness from one-fiftieth to one-twentieth of an inch. All parasites beneath this layer die in from 2 to 20 hours; the time is dependent on factors which we have not determined." The same author has shown that the consistency of the protoplasm of the malarial plasmodium is less yielding than that of the red blood corpuscle. "Large æstivo-autumnal plasmodia are round or oval, the tertian variety are more or less flattened." Such differences in the physical characters of the infected red corpuscles may determine in part the zone the living plasmodium occupies—namely, the intermediate layer. It may be, therefore, that this technique is of value in concentrating in this layer the infected corpuscles.

The alternative explanation is that an actual increase in the number of parasites has occurred—that is, the parasites have multiplied. If increase in the number of parasites indicates actual development, then segmentation of a mature schizont must have taken place in the culture-tube during the 20 to 24 hours' incubation. As only merozoite forms were found in the cultures, and, moreover, no further progress in the life-cycle followed a further incubation, it is manifest that this method allowed of the development for only a portion of the asexual cycle, in contradistinction to Bass's method, which permits of the cultivation of the parasite throughout one, or more than one, generation. In our experiments further incubation produced a gradual diminution in the number of parasites seen in the films. It is admitted that the possibilities of this technique are confined to aiding clinical diagnosis.

Blood incubated in citrated broth, but without the addition of dextrose, did not permit of the development of the "dot" forms in the culture tubes. The citrated plasma medium with dextrose may be said to permit of concentration of, and life of, the plasmodium for a period of 24 hours or more, while with Bass's medium the patient's serum with dextrose permits of concentration plus life plus development of the plasmodium.

Whether the true explanation of the results is an apparent or a real increase of parasites in the intermediate layer or both the evidence permits of no dogmatic opinion.

Conditions of growth.—The favourable conditions of growth are three:—

1. The presence of dextrose in the medium, as already stated, is essential. Bass and Johns,[1] in October, 1912, published their discovery of this important factor. Further, they found that maltose alone of many carbohydrates tried—e.g., saccharose, lactose, galactose, dextrine, mannite—could replace dextrose.

The percentage of sugar in normal blood is about 0·1 per cent. It has been shown by Maclean[3] that when normal blood is incubated for four hours at 37° C. active glycolysis occurs owing to the action of the leucocytes. Further, Maclean has shown that normal blood is capable of glyco-

* A paper read before the Salonika Medical Society on Feb. 14th, 1917

lysis whether or not sugar is added. He gives "0·4 per cent. or so" as about the maximum of sugar met with in diabetic blood, and records an experiment with normal blood to which glucose had been added, so that the total amount was 0·358 per cent., while after three hours' incubation at 37° C. the glucose was estimated at 0·281 per cent. This is a di-tinct reduction, but on the lines of our experiments with amounts such as 2·5 and 10 per cent. of added glucose it indicates that much of the added glucose is unaffected. Accordingly, in our experiments dextrose was added to the medium in quantities sufficient to obviate this diminution in dextrose content by the leucocytes. Strengths of dextrose varying from 2 per cent. to 10 per cent. were tried and the best results obtained in the 5 and 7·5 per cent. solution. At variance with this conclusion is the recommendation of Bass, as to the strength of dextrose, in his second publication. Bass using undiluted human serum as the culture medium added dextrose in such quantity that the final mixture contained 0·5 per cent dextrose. The successful results obtained by Bass and Johns have been confirmed.

2. Bass in his original paper emphasised the importance of strict *anaerobiosis*, but in the second publication the technique recommended does not necessitate anaerobic cultivation. Whether the employment of glucose in the medium secures anaerobiosis or no, certain it is that, using both anaerobic and aerobic methods, we achieved precisely the same results. The red corpuscles by reason of their avidity for oxygen seem to remove the oxygen from the fluid medium and so contribute to the maintenance of an anaerobic state.

3. The optimum *temperature* is given as 40° C. Bass noted the segmentation of æstivo-autumnal parasites from the smallest rings in about 30 hours at 40° C., and that the parasite will develop, but more slowly, at any temperature between 37° and 40° C. In this series all cultures were incubated at 40° C.

Attempts to cultivate the benign tertian parasite, as already noted, have with this technique so far met with no success. How different is the case of the malignant parasite which can live and develop partially in an unfavourable culture medium! Now, as Bass has grown the three malarial parasites, a comparison of the two methods, based as yet on a small number of cases, is fitting.

The literature of this subject, which was not even available at the outset of these investigations, is limited to two papers. Bass and Johns [1] have recorded that they successfully cultivated the æstivo-autumnal parasite from each of 29 different patients and the benign tertian parasite six times. One case of quartan was tested, but the parasites failed to grow. The lack of success was ascribed to certain errors of technique: "It is to be remembered that one of us (Bass [2]) obtained growth of the quartan parasite in his earlier work."

Thomson and McLellan,[4] employing Bass's method but incubating at the lower temperature of 38° C., were able to cultivate the malignant parasite from two patients. The development of the plasmodium through one generation was followed. Sir Ronald Ross was convinced, after examining the preparations of Bass and Thomson and McLellan, that the evidence of the successful cultivation of plasmodium falciparum up to the sporulating f rms was indisputable.

Bass's original technique.—One-tenth of a cubic centimetre of a 50 per cent. dextrose solution (Merck's) for each 10 cubic centimetres of blood to be taken is placed in the defibrinating tube before the blood is drawn. Defibrination is effected by gently stirring or whipping with the rod which extends through the wool plug. The whipping in of air, causing bubbles, must be avoided. The defibrinated dextrose blood, sufficient in amount to ensure of a depth of serum one-half to one inch above the red cells when the latter have settled, is transferred to two culture tubes and incubated at 40° C. The parasites may be examined at any interval by drawing a small quantity of cells from the intermediate layer by means of a capillary tube. Fine capillary tubes should not be used as the infected red cells may be damaged. Great care must be taken in handling tubes to keep them in the upright position. To defibrinate the blood we used a bundle of stiff wire twigs attached to a glass rod extending through the wool plug.

Remarks.—The material at our disposal during the last six weeks has been principally the benign tertian parasite. Nine cases have been examined by Bass's method, four of which have given a completely negative result. These latter cases had received doses of quinine in liquid form of 20, 40, 20, 20 grains respectively. In two instances the control film at the time of hæmoculture was negative. The five patients from whom positive cultures were obtained had received respectively the following amounts of quinine—0, 0, 5, 15, 10 grains. The parasite developed typically for 15, 45, 18, 17, 12 hours. Increase in the number of parasites, as judged by a comparison of the control film with the culture film, was noted in three instances. In the remaining two positive results the parasites were plentiful. Development up to segmentation was seen in two cultures.

Employing the citrated plasma medium, negative results were obtained in six cases of benign tertian infection. One case of quartan malaria continued its development up to the formation of merozoites. Increase of parasites was noted. Three other negative results were recorded. In two the control films showed a few crescents but no ring forms. In the third case there were a few fine ring forms. This patient had been given 40 grains of quinine during the preceding 24 hours. The remaining positive result is of interest. The patient had been taking 10 grains of quinine daily in tabloid form since leaving hospital in September, 1916. The control film showed scanty fine ring parasites with nucleus and vacuole but no crescents. Development was followed for 38 hours with the appearance of the malignant parasite in culture. The number of parasites was much increased, and there was a tendency, as noted by others, for the parasites to collect in groups. In the citrated plasma medium numerous "dot" forms were found at 24 hours. Fine ring forms were also seen.

The influence of quinine in culture.—It seems certain that the presence of quinine in the serum used in the culture medium influences the development of the plasmodium, the benign tertian parasite especially, *in vitro*.

In the living body a marked diminution in the number of benign tertian parasites from the peripheral blood within 12 to 24 hours of the giving of quinine in doses of 15 to 20 grains is observed commonly. Quinine given in fluid form by the mouth can be demonstrated in the urine after half-an-hour's interval, and by the end of 48 hours the greater part has been excreted chiefly by the urine and to a less extent by the sweat and bile. Clearly, then, the actual serum used for the culture medium will, if the drug has been administered recently, contain a certain amount of quinine.

The exact manner in which quinine exerts its destructive influence is still largely a matter of speculation. Thomson and McLellan [4] noted incomplete segmentation of the æstivo-autumnal parasite obtained from a patient who had been taking 5 grains habitually. A parasite of the same species recovered from another patient who had not taken quinine grew abundantly. Bass does not mention the influence of quinine in his cultures.

Summary.

The material embodied in the first portion of this paper, based on 51 cases, is probably large enough to admit of certain statements. Cases of clinical malaria in which the blood films were negative have been confirmed by cultural methods. Of 10 patients whose control blood films after careful examination were considered as negative, "dot" forms were found in five cultures. The two tertian parasites behave differently in culture. Of 19 cases of malignant malaria, 4 only gave completely negative results in the citrate plasma medium, while 17 cases of the benign tertian parasite failed to grow under the same conditions. As a corollary of this, where film examinations are inconclusive as to the type of parasite, a positive culture in this medium points to malignant infection. The employment of this medium as a routine in hæmoculture may prove to be of value in assisting and confirming a clinical diagnosis.

If with improvement of technique on the lines of Bass's method the cultivation of all three varieties of the malarial parasite can be made certain and permit of exact study, a step will have been made towards solving some of the many problems of malaria awaiting solution.

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TETANUS AND ITS ANTITOXIN.

WITH AN ILLUSTRATIVE CASE.

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WHEN the medical history of the present war comes to be written one of its most interesting features will undoubtedly be that section relating to the incidence of tetanus amongst the wounded from the various fronts, and recording the success which has attended its preventive and curative treatment.

From a comparatively early stage of hostilities in France antitetanic serum has been in use throughout the British Expeditionary Force for all wounds likely to have become contaminated, subcutaneous or intramuscular injections being given as early as possible and repeated as circumstances seemed to indicate. How far this measure is to be regarded as having contributed to the saving of life and suffering will be definitely ascertained when full statistics have been tabulated. That a large amount of success is to be attributed to this *prophylactic* measure is already admitted by all who have had the opportunity of studying cases of the disease brought from the seat of war to the military hospitals in this country. To what extent tetanus antitoxin is to be recommended as a *curative* agent is a question which will also, doubtless, be largely elucidated by the teachings of the present war.

The following case, which resulted in recovery, is typical of many met with in the home hospitals during the war, and also presents some interesting pathological features.

On July 1st, 1916, in the attack on Montauban, Lance-Corporal —— was wounded on the right shoulder by two fragments of shrapnel. No dressing till next morning, when a piece of metal and piece of khaki were removed from the larger wound. Antitetanic injection given, and a second injection next day at Boulogne.

On July 10th, on admission to Milton Hill Hospital, Berkshire, the patient appeared in good health. Examination of shoulder showed two unhealthy-looking wounds on posterior aspect. The upper and larger one, just behind and below the acromion, was a superficial granulating area about an inch across. The lower wound, over posterior fold of axilla, penetrated deeper; X rays disclosed a piece of metal embedded in muscles at bottom of wound. Both wounds were decidedly septic and were treated by hot fomentations and rest to the arm. After 10 days the wounds showed little disposition to heal.

On July 23rd patient complained of some stiffness in the shoulder. Next day the whole arm from shoulder to wrist was in a state of tonic rigidity, and acutely flexed at elbow; no actual pain when arm was kept at rest; no painful spasms as yet; uneasiness in throat and right side of neck, and difficulty in swallowing food; pulse and temperature normal. In the afternoon Sir William Osler saw him and made the following note: "No fever; patient complains a little of pain in the epigastrium and back and right shoulder. The arm is flexed at the elbow; muscles stand out prominently and feel rigid. Patient can flex and extend the fingers, but cannot extend the arm; forcible extension does not hurt him. Pectoral muscles are not involved; deltoid feels stiff. Patient cannot lift his head off the pillow. He has occasional spasms of back and neck and arm with great pain. He opens his mouth fairly well."

By evening the paroxysms had increased in frequency and severity, as also in area involved. The muscles of whole right side of body except those of the leg were in a state of tense rigidity; the abdominal wall was retracted and hard as a board; the left side of the body, except the left side of the abdominal wall, was unaffected. Jaw clenched; head turned to right side. Painful paroxysms, affecting only the right side, were brought on by any attempt at movement.

By lumbar puncture 6 drachms of cerebro-spinal fluid[1] were drawn off and 2000 U.S.A. units of tetanus antitoxin injected into spinal canal; 2000 units also given intramuscularly; chloretone gr. xxx. per rectum.

July 25th: Patient slept at intervals during the night, but when awake suffered much from sickness and pain in head and legs; very profuse perspiration. Although the arm and right side of body generally remained rigid, the tetanic spasms did not increase in severity during the night. Another injection of chloretone, gr. xxx., per rectum and antitoxin, 2000 units, intramuscularly.

[1] Cerebro-spinal fluid examined was found to contain a faint trace of albumin, no sugar, no cells, no deposit.

On July 27th rigidity of right side and flexure of arm remained the same, the muscles of back of neck and posterior fold of axilla being specially hard; abdominal wall tensely contracted and very tender to touch. The jaw could be opened but very slightly; "risus" well marked. The arm could be forcibly extended to a considerable extent without pain, but on relaxing it it returned to its flexed position, and this was immediately followed by a painful spasm involving the whole right side. Even the leg was then thrust out as in cramp, but the foot appeared unaffected. Patient complained of sore-throat and severe pain in epigastrium. Retention of urine had been experienced, but catheter not required. Antitoxin 2000 units intramuscularly. Chloretone gr. xxx. per rectum.

On July 29th rigidity the same; several spasms noted during the night, confined chiefly to right upper quadrant of body. Jaw immovably fixed; feeding difficult. Only liquids could be taken, and the act of swallowing was very painful. Masses of tough dark phlegm formed in the throat were got rid of with extreme difficulty. Nutrient enemata commenced. Patient still lay with head turned to right side; mouth also drawn a little to the right, and eyes sometimes involuntarily rolled to that side; tongue bitten during sleep.

On July 31st the general condition was much the same. A notable feature was that the hand and fingers had been quite freely movable all along. Neither were they affected during the paroxysms of spasm.

On August 1st, except that abdominal muscles were still very hard and tender, the rigidity of the right side appeared to be relaxing. The head could be moved a little from side to side, but could not be raised. Teeth firmly clenched but separated a little during sleep. Painful spasms were still excited on small provocation.

On August 5th the general rigidity of the arm and forearm, and the tendency to attacks of spasm, were gradually becoming less pronounced. The jaws could be opened about half an inch, but the idea of solid food was dreaded. The patient was seen by Sir David Ferrier, who observed: "There is slight transitory ankle clonus in the right foot; no Babinski reaction; knee-jerk slightly exaggerated. The movements of the proximal muscles of the right limbs are involved in spasm, whilst the distal muscles (hand and foot muscles) are not affected. The abdominal muscles are very rigid. There is a certain amount of spasm of the thoracic muscles, but the expansion of the chest is found on measurement to be about normal. The platysma, trapezius, and sternomastoid on right side are only slightly rigid. The deltoid and biceps are very hard. The arm is firmly flexed at the elbow. It lies across the chest and cannot be voluntarily moved. Forced extension immediately produces spasm."

On August 6th there was severe abdominal pain, mostly on left side. On the 7th this pain extended down left leg, which was much swollen from the knee downwards. The internal saphenous vein was hard and very tender. An attack of acute phlebitis, depending on a thrombus, probably of the iliac vein, had thus supervened. For several days the swelling of the leg increased, and extended upwards to the groin, being accompanied by much pain, but only slight rise of temperature. In a week the swelling began to subside, and in another week the phlebitis had practically gone; slight swelling and discoloration of the leg persisted, however, for several weeks.

On August 13th, except for the muscles of right arm and forearm, which were still rigid, preventing full extension, the muscles of the right side were no longer in spasm. They felt abnormally soft and flabby. Patient was beginning to take solid food, but had a sensation as if his tongue were tied. Painful spasms were still excited in the arm on attempts forcibly to extend it.

From this time steady progress was made, but in spite of abundant nourishment and exercise the patient's whole muscular system was for months deficient in tone. He was easily fatigued, and complained of pains in the calves of the legs, and aching in the muscles generally, after even slight exertion. For a long time the arm movement was very imperfect, and the elbow could not be voluntarily, or even by force, brought into a straight position, or raised above the head. There remained a good deal of tenderness on pressure over the shoulder-joint and along the line of the cervical plexus.

With regard to the prophylactic effect of tetanus antitoxin it is rational to conclude that it will vary according to the amount of toxic material introduced into a wound, as well as to the dose of antitoxin given. It is also a well-established fact that the effect will be largely influenced by the route of administration, the intrathecal route having been found by far the most efficacious. Thus the result of an injection of the serum may be: (*a*) Complete neutralisation of the poison and non-appearance of the disease; (*b*) extension of the period of incubation and late appearance of the disease (delayed tetanus); (*c*) limitation of the

area affected by the disease (localised tetanus); (*d*) diminished severity in the manifestations of the disease (modified tetanus).

Clinical and also experimental evidence support the contention that each and all of these results have been attained. During the later periods of the war, when prophylactic treatment has been almost universally resorted to amongst the wounded in the Western front, the fall in the incidence of tetanus has been very remarkable. There is also evidence to show that wounds, in the discharges of which bacilli resembling *B. tetani* were found, and which were subsequently treated by antitetanic serum, have not been followed by tetanus.

The proportion of cases of tetanus with long incubation stage has largely increased since this mode of prophylactic treatment has become general. The comparative increase in the number of cases of limited or localised tetanus is abundantly shown by more recent reports. That the severity of the disease has been greatly mitigated by the prophylactic use of antitoxin is clearly shown by the marked decline in the mortality of the disease during recent years, both in this country and in America.

From considerations such as these the conclusion seems warrantable that the preventive treatment of tetanus by means of its antitoxin is a sound and beneficent measure which ought to be followed up to the fullest limits which experience dictates to be safe.

The curative treatment of tetanus by this same agent stands on a somewhat different footing, but the increasing number of recoveries recorded in cases where it has been energetically employed encourages the hope that here also we possess a remedy of unquestionable value. I can recall a case which I treated some four years ago by the combined intrathecal and intramuscular injection of antitoxin. This was a severe and rapidly developing form of the disease, exhibiting general tetanic convulsions with opisthotonos. No prophylactic had been employed in this case, yet, contrary to my expectation, recovery took place. In the case of Lance-Corporal ——, above recorded, the disease had secured a firm hold, and was rapidly increasing in severity up to the time of the first intrathecal injection. From that time the virulence of the attack appeared to be arrested, and no extension of the area involved was afterwards noted. The frequency of the paroxysms also seemed to be diminished in consequence of the treatment.

Referring further to the lance-corporal's case, there are one or two points of pathological interest. The unhealthy appearance of the wounds on patient's admission ten days after their infliction, and their resistance to careful treatment for a fortnight longer, suggested the presence in the tissues of something more than the mere fragment of metal. I have in several cases noted this unaccountable delay in healing in wounds subsequently followed by tetanus. It may be that tetanus spores lodged in a wound have the effect of maintaining an unhealthy septic condition; and this delay in healing, in the absence of any other obvious cause, may put the surgeon on his guard as to the possibility of impending tetanus in any case which obstinately resists ordinary methods of treatment. It may even lead to a diligent search being made in the discharges for the spores or bacilli of tetanus. A very notable circumstance in this case was the rapid improvement in the wounds which set in immediately after the first injection of antitoxin. The discharge ceased within two days and the wounds rapidly cicatrised.

The localisation and limitation of the disease in the above case also deserve attention. From beginning to end the attack may be described as strictly *unilateral*. At no period was any portion of the left side involved in spasm, with the exception of the abdominal wall and other parts where the muscles of the two sides act in association. Even in these the contractions were more marked on the right side. The anatomical continuity of the muscles of the two sides of the abdomen would account for the apparent spasm of the whole abdominal wall. It was also observed that throughout the attack the right hand and foot were entirely unaffected by spasm, voluntary movement and sensibility also being normal in both.

These observations are corroborative of the theories (*a*) that the morbid condition in tetanus is primarily confined to the nerves, spinal cord, and subcortical centres in direct connexion with the seat of infection, but that it may subsequently, in consequence of the intensity of the infection or in the absence of any counteracting influence, such as antitoxin, extend to the nerve centres generally, and thence involve the entire muscular system; and (*b*) that the channel of transmission of the tetanus toxin is principally the nerves leading from the point of infection, and not the blood current or the general lymphatic system.

With reference to the rigid condition of the arm and shoulder after the tetanic symptoms had passed off, the question arises, Was the stiffening, which persisted for many weeks, a result of (*a*) a fibrosis of the muscles mainly involved in the prolonged spasm, or (*b*) a periarthritis due to continued irritation of the metal which still was in close relation to the shoulder-joint, or (*c*) a nerve implication due to proximity of the metal to the sheaths of the brachial plexus? Probably all of these conditions participated in preventing for a long period the restoration of the arm to its full measure of utility.

In contemplating the removal of the piece of metal still *in situ* it will have to be borne in mind that such an operation is fraught with considerable risk of re-exciting the disease, and that special precautions, including a preliminary injection of tetanus antitoxin, will have to be observed.

Yet another remarkable feature of the case was the occurrence of thrombosis with phlebitis of the iliac and femoral veins as a sequel to the tetanus attack. I can find no record that this association has ever hitherto been observed.

A CONTRIBUTION TO THE STUDY OF DYSENTERY.

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TEMPORARY HONORARY CAPTAIN, R.A.M.C.;
AND
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(*An Interim Report to the Medical Research Committee from the Laboratory, Mont Dore Military Hospital, Bournemouth.*)

EARLY in October, 1916, it was ascertained by one of us (D. G. L.) that carriers of *Entamœba histolytica* cysts were to be found among the dysentery convalescents invalided from France and Flanders. It was therefore decided to search each convoy arriving from France for amœbic carriers as thoroughly as time allowed. Between Nov. 3rd, 1916, and Jan. 4th, 1917, 159 dysentery convalescents were admitted to the hospital direct from France. The incidence of carriers of *Entamœba histolytica* cysts among these 159 cases is indicated in Table I.

TABLE I.

Number of cases admitted.			Number of amœbic carriers discovered.		
British.	Australian.	Other Colonial troops.	British.	Australian.	Other Colonial troops.
134	21	4	13	5	0

So that nearly 10 per cent. of the British cases and 24 per cent. of the Australian cases were carrying *Entamœba histolytica* cysts.

Now examination of the blood of these amœbic carriers revealed the fact that in 7 out of the 18 cases the blood-serum agglutinated the *B. dysenteriæ* Flexner or the *B. dysenteriæ* Shiga in a dilution sufficiently high to warrant the diagnosis of a recent infection by one or other of these bacilli.[1]

This coincident finding of *Entamœba histolytica* cysts in the stools and specific agglutinating substances in the blood seemed sufficiently suggestive to warrant further observations

[1] The agglutination test was carried out by Dreyer's method with Standard Cultures prepared in the Department of Pathology, University of Oxford, on behalf of the Medical Research Committee. In this report the test will merely be referred to as being positive or negative for the test, and its diagnostic value will be fully dealt with in a separate report.

on the point. To date we have had access to 97 carriers of *Entamœba histolytica* cysts invalided from France or Flanders as dysentery convalescents. The results obtained by examination of the blood are shown in Table II:—

TABLE II.—*Agglutination Tests in the Case of Amœbic Carriers from France.*

Number of cases ...	97
Number of cases in which the blood agglutinated B. Flexner	26
Number of cases in which the blood agglutinated B. Shiga	7
Number of cases in which the blood failed to agglutinate eitner B. Flexner or B. Shiga...	64

Of these 97 cases, 66 had never been with any other than the B.E.F., nor had they at any time previous to the war visited a country in which amœbic dysentery is known to be endemic. They must, then, have become carriers in France. In 38 of these 66 cases a history of contact with likely sources of infection was obtainable.

For sake of comparison it was decided to examine in a similar manner carriers of *Entamœba histolytica* cysts invalided from the Mediterranean area, with a few exceptions from Salonika. The results obtained are set forth in Table III.:—

TABLE III.—*Agglutination Tests in the Case of Amœbic Carriers from the Mediterranean.*

Number of cases ...	98
Number of cases in which the blood agglutinated B. Flexner	5
Number of cases in which the blood agglutinated B. Shiga	28
Number of cases in which the blood failed to agglutinate either B. Flexner or B. Shiga	65

It will be noticed that the percentage of positive and negative agglutination tests is identical with that obtained in the cases invalided from France. When, however, the cases with positive agglutination tests are considered it is found that some 78 per cent. of the French cases are accounted for by the B. Flexner, whilst conversely over 80 per cent. of Mediterranean cases are accounted for by B. Shiga. Finally, amœbic carriers admitted to the hospital from the Forces in India, Mesopotamia, and Egypt have been similarly examined. The results are exposed in Table IV.:—

TABLE IV.—*Agglutination Tests in the Case of Amœbic Carriers from India, Mesopotamia, or Egypt.*

Number of cases ...	35
Number of cases in which the blood agglutinated B. Flexner	1
Number of cases in which the blood agglutinated B. Shiga	3
Number of cases in which the blood failed to agglutinate either B. Flexner or B. Shiga...	31 (88·5%)

The experiments referred to above are, in our opinion, suggestive from several points of view. For the reason, however, that they only form the beginning of a series of researches we do not propose, for the present, to go more deeply into matters than we have already done.

One conclusion of practical import may, however, be emphasised. It is highly important that careful protozoological as well as bacteriological and serological examinations be made in every case of dysentery coming under investigation. A positive bacteriological or serological finding, for example, does not preclude the necessity for a careful protozoological examination.

In conclusion, it is a pleasant duty to acknowledge our indebtedness to Lieutenant-Colonel T. H. F. Clarkson, R.A.M.C., officer commanding Mont Dore Military Hospital, Bournemouth, for permission to publish this note and for whole-hearted support and encouragement.

LITERARY INTELLIGENCE.—The fourth edition of Mr. Comyns Berkeley's "Handbook of Midwifery" is announced for early publication by the house of Cassell. It has been considerably expanded to meet the additional requirements of the Central Midwives Board and to render it suitable for obstetric dressers.

TRAUMATIC DISLOCATION OF THE KNEE-JOINT:

A REPORT OF TWO CASES.

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(*From the Orthopædic Department, Ancoats Hospital.*)

COMPLETE traumatic dislocation of the knee-joint is a condition seen so infrequently that it is well worth while recording all cases of this type. During the last 18 months two individuals with this rare injury have been admitted to the Ancoats Hospital, Manchester, under my care and I have had an opportunity of controlling the treatment in both cases and of observing the functional result obtained.

CASE 1.—L. S., a female aged 20, whilst crossing a field in the dark, slipped, caught her left foot in a hole, and fell over backwards on to her left side. She was brought to hospital on Sept. 17th, 1915, within an hour of the accident, a tentative diagnosis of fractured femur having been made by an outside doctor. On examination the left knee-joint revealed an obvious complete dislocation, the femur being displaced backwards, the upper end of the tibia being abnormally prominent, with a deep hollow above. The amount of effusion in and around the joint was strikingly small, and there were no signs of any circulatory obstruction in the limb. A radiogram (Fig. 1) was taken before reduction was attempted, this latter manœuvre being accomplished with ease by Dr. W. S. Booth, the senior house surgeon to the hospital. The limb was then put up on a back-splint, and after ten days' stay in hospital the patient was sent home to Wolverhampton, a plaster cast having been applied extending from the toes to the groin. Five months later the patient was readmitted to hospital and the cast removed. The injured joint was now absolutely stiff in the position of full extension; no motion could be elicited even though considerable force was exerted. A radiogram showed atrophy of the cancellous tissue of the bone ends, but there was a clear cartilage line on both bones. The girl began to walk on the limb, wearing a calliper splint for the first two months. Her present condition (15 months after the accident) is as follows: The knee-joint is firmly ankylosed, the patella being adherent to the anterior surface of the femur. The patient walks well without pain and is following her occupation.

FIG. 1.

L. S., dislocation of knee-joint. Backward displacement of femur; no lateral displacement.

CASE 2.—J. E., a man aged 47, fell from the top of a ladder to the ground a distance of 12 feet, his left knee striking a plank, the point of impact being localised to the inner side of the joint. He was admitted to hospital on April 1st, 1916, some 20 minutes after the accident. The left knee showed all the signs of a complete dislocation, with the femur displaced backwards and slightly outwards. There was a moderate effusion into the joint, but no evidence of vascular obstruction. A skiagram (Fig. 2) was taken before reduction by the senior house surgeon, Dr. H. M. von Mengershausen. Reduction, as in the first case, presented no difficulties. At the end of a week the man left hospital with his leg in a plaster cast. This fixation was maintained for four months. On removal of the plaster the joint allowed five degrees of

active and passive flexion, and the patella was freely movable. On testing for abnormal mobility a slight "give" was experienced in both lateral directions. A calliper splint was provided and worn for six weeks. Seven months from the time of the injury the man began light work. His present condition (11 months after the accident) is as follows: The knee-joint is painless, and shows a range of 20 degrees of flexion; there is definite abnormal lateral mobility of the tibia on the femur; this can be elicited by firm manipulation, but is not evident to the man during ordinary use of the limb. The man is now working at his old employment as a labourer and is carrying out full duties with the exception of climbing ladders.

FIG. 2.

J. E., dislocation of knee-joint. Backward and outward displacement of femur.

In the two cases described above, as in all complete dislocations of the knee-joint, total rupture of both crucial ligaments with extensive tearing of the capsule, must have occurred. Under conservative treatment, prolonged over a sufficient period, there is every chance of spontaneous repair of these torn structures. This fact has been repeatedly emphasised by Robert Jones, who has seen some extraordinarily good functional results in this type of injury, when continued fixation has been employed. In several of the cases described by this author considerable degrees of motion have been preserved, enabling the individuals to return to full work involving kneeling or to indulge in active sports. The results in my two cases have fallen short of this ideal.

In the case of the young woman I am inclined to regard the period of fixation as too long; as she had gone home to the Midlands there was great delay and trouble in having her readmitted to the hospital; thus we lost valuable time. It is possible that in the course of time there may be a certain degree of stretching of the fibrous mass which fills up the position formerly occupied by the crucial ligaments, with a consequent development of motion in the joint. I have not considered it justifiable to attempt to gain mobility by the use of forcible passive movement, so in this case I look upon the result—viz., firm fibrous ankylosis—as likely to be permanent.

In the second case, after four months' work, there has been a definite increase in the mobility of the injured knee, but I do not anticipate further appreciable increase, as there is very stout resistance to flexion beyond 20 degrees. The man is doing heavy work with comfort, and expresses himself as very satisfied with the result. The accompanying radiograms are probably unique. For their existence and for the notes of the cases on admission to the hospital I am indebted to my former house surgeons, Dr. Booth and Dr. von Mengershausen.

References.—Jones, R.: Injuries to Joints, 1915; Notes on Military Orthopædics, part vi.; Brit. Med. Jour., August 5th, 1916. Jones and Alwyn Smith: On Rupture of the Crucial Ligaments of the Knee, and on Fractures of the Spine of the Tibia, Brit. Jour. Surgery, July, 1913.

OUR contemporary *Knowledge* (83, Avenue Chambers, W.C.1), which was founded by the late Richard A. Proctor in 1881 and has for many years disseminated accurate scientific knowledge in a popular form, is to be a quarterly magazine during the war.

THE OPERATIVE TREATMENT OF ABDOMINAL ANEURYSM.

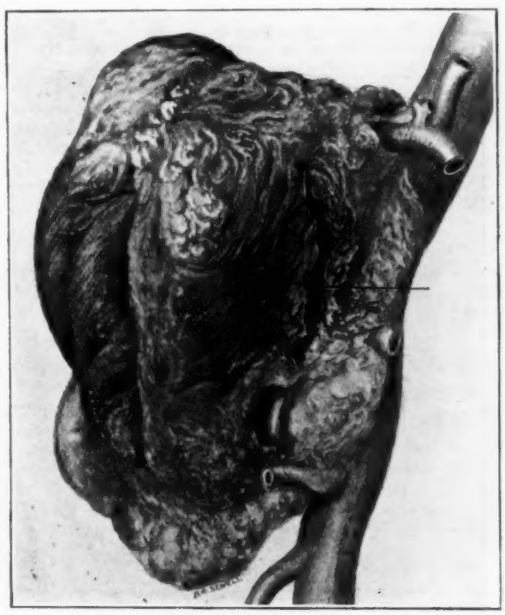
BY W. I. DE C. WHEELER, F.R.C.S. IREL.,
HON. MAJOR, R.A.M.C.; HON. SURGEON TO THE FORCES IN IRELAND.

FIVE years ago, at the annual meeting of the British Medical Association held in Birmingham,[1] I brought before the Association the details of two cases of abdominal aneurysm treated by operation. A year later a third case came under my care, and, like the others, was treated by the introduction of wire into the sac. I am now in a position to record the results of operation in the three cases, and in so doing hope to add some information to a subject which has engaged surgical attention for many years.

It is noteworthy that every reported series of cases treated by operation contains a percentage of cures, but the earlier cases dating from the year 1865 showed a discouraging mortality. Osler states that Nature occasionally cures a case. Now and again the physician is able to effect a cure, but he had never seen such a case, and in a few instances he thinks that the surgeon prolongs life or even effects a complete cure. Most of the cases mentioned by Osler lived from a few hours to six months after operation, one surviving three and a half years.

The recogoition of the fact that the introduction of a foreign body into an unhealthy area, such as wire into an aneurysm, requires an aseptic technique of a very special kind, has rendered the results of recent operations more

FIG. 1.



Side view of aneurysm. The line marks the point of rupture. (One-half natural size.)

favourable. In a case of fracture treated by the application of screws and plates accidental sepsis may be retrieved by the removal of the screws and plate, but once the wire is introduced into the sac of an abdominal aneurysm it is past recall and the surgeon is unable to retrace his steps.

The use of Colt's apparatus[2] removes the danger caused by the advance of wire from the sac of the aneurysm into the aorta beyond. At least six cases succumbed to this cause in the old days. Rupture of the aorta or of a secondary aneurysmal sac may to some extent be obviated by the rigid application of antispecific treatment, as it is now understood. There is also the possibility of emboli being carried

[1] Brit. Med. Jour., 1911; THE LANCET, 1911, ii., 507.
[2] THE LANCET, 1903, ii., 808.

from the sac during, or after, the introduction of the wire; death from this cause, however, has been extremely rare.

The results of my three cases are as follows:—

In the first case of aneurysm of the aorta in the region of the cœliac axis, operated upon in August, 1910, a cage of 150 inches of Colt's wire was introduced. At the time of operation the aneurysm was thin-walled and seemed ready to burst. The patient is still alive and well, at daily work in a brewery. The aneurysm has consolidated and a loud systolic murmur present before operation has disappeared.

The second case, also reported upon in 1910, died in March, 1916, from rupture of the aneurysm, when acting as a stoker in the R.N.R. on board a patrol trawler. A wisp of 105 inches of wire was introduced in this case. A complete post-mortem examination was obtained, the details of which are given below.

The third case was operated upon in 1912 and died about a week after the introduction of the wire from rupture of the aneurysm following intestinal obstruction. A gastro-enterostomy was performed in this case as the aneurysm was obstructing the pylorus. The loop of jejunum fixed to the stomach became strangulated by pressure between the abdominal wall and the aneurysm; the consequent vomiting led to rupture of the sac.

In analysing these three cases the first man may be fairly said to be cured. The operation was performed six years ago, at a time when the sac was large and thin-walled. At present the only remaining sign of an aneurysm is a hard mass which transmits the pulsation of the aorta to the abdominal wall. The patient is in good health and performs a full day's work.

The second case lived over five years, and died, while acting as a stoker on board a trawler, from rupture of the sac. From the post-mortem examination it may be fairly claimed that this case was practically cured, and but for the

FIG. 2.

X ray photograph showing Colt's wire within the sac.

fact that the man was occupied in one of the most strenuous occupations the greatly consolidated aneurysm might never have ruptured.

No conclusions can be drawn from the result of Case 3, the rupture of the aneurysm after the introduction of the wire being obviously due to the vomiting of acute intestinal obstruction.

I am indebted to Surgeon H. E. King Fretz, R.N., for the following post-mortem examination and other notes on Case 2.

The patient, aged 37, a stoker, R.N.R., on one of the patrol trawlers, was admitted into the Naval Hospital on March 12th, 1916. He complained of vomiting and severe shooting pain in the right lumbar region simulating renal colic. There was tenderness in the region of the appendix and pain on deep inspiration. He was sweating freely and in a state of collapse. There was a large pulsating tumour which practically occupied the whole of his epigastric region, apparently an aneurysm of the abdominal aorta. His temperature was 97° F.; pulse 120, full and regular; systolic pressure 280 mm., diastolic pressure 120 mm. His urine showed a heavy deposit of urates and a trace of albumin. There was an excellent scar to the left of the mid-line 3 inches long, the result of operation five years ago. A systolic bruit could be heard over the swelling, propagated all over the abdomen and down both femoral arteries. There was a marked diastolic sound in the mitral area and a very accentuated second sound in the aorta. Seven days after admission he died. The swelling continued to pulsate long after respirations had ceased.

At the autopsy it was found that there was a small leak, the hæmorrhage penetrated between the layers of the mesentery, separated them widely apart, and surrounded a large portion of the small intestine. The right kidney was pushed forward. Both kidneys and spleen were normal in size, the right kidney having small granular patches on the surface. The heart was much enlarged. "Now for the aneurysm, I am not exaggerating when I say that the clot formed in it is as hard as a rock, the aneurysm itself is about the size of a full term fœtus' head. It appears to me as if there is a secondary dilatation of the aorta below the main swelling and that is where the trouble arose."

I am also indebted to Surgeon King Fretz for the specimen which is faithfully illustrated in Fig. 1, and for the X ray photograph showing the wire *in situ* (Fig. 2).

It is noteworthy that all three cases presented themselves at hospital complaining of severe pain in the back, and that in none was there any erosion of the vertebræ. It is possible that the intense pain in the back, common to cases of abdominal aneurysm may be due to the stretching of the highly sensitive posterior parietal peritoneum, which is also in these cases subject to a pull at every pulsation of the tumour.

Dublin.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF MEDICINE.

Exhibition of Autochromes.

A MEETING of this section was held on March 27th, Dr. T. D. ACLAND being in the chair.

Dr. C. R. BOX and Mr. WALTER EDMUNDS exhibited a series of autochromes illustrating the rashes of rubella, measles, scarlet fever, typhoid, cerebro-spinal fever, and pellagra in cases treated at the London Fever Hospital. The autochromes were the products of a three-colour process, the rays of light being transmitted through starch granules, coloured respectively green, orange, and violet, before coming into contact with the customary photographic emulsion. This permitted a very faithful portrayal of the characteristic rashes. The chief drawbacks to the method were the length of exposure necessary with daylight, the intensity of the arc light required when daylight was not used, the impossibility of reproduction, and, for demonstration purposes, the short distance from the screen at which the images must be viewed to appreciate their details.

SECTION OF SURGERY.

Treatment of Severe Infected Gunshot Injuries of the Shoulder and Elbow Joints.

A MEETING of this section was held on March 14th, Colonel H. J. WARING being in the chair.

Major R. H. JOCELYN SWAN read a paper on the above subject, in which he advocated early excision of the joints with the object of obtaining mobility. The paper is published in full in our present issue.

Mr. KENNETH GOADBY, who had been collaborating with Major Swan, spoke from the bacteriological standpoint. He showed by lantern slides of the pus the high degree of septicity of such wounds. Besides ordinary pyogenic organisms, anaerobes (*B. perfringens*, the bacillus of malignant œdema, *B. Hibner IX*) were commonly present. The streptococci did not seem to be as virulent as those found in civilian practice, such as in post-

mortem wounds, for the percentage of cases in which septicæmia resulted was very small. The anaerobic organisms were found in great numbers in the damaged bone tissue, especially in sequestra and in fragments of detached bone; this lent support to the method of treatment adopted by Major Swan, especially in view of the fact that the organisms persisted for many months in their comparatively secluded positions. He attached some importance to the preparatory course of mixed vaccines which had been employed. Since early treatment was desirable he advocated the use of heterogeneous vaccines prepared from cultures grown on the blood of patients who had got well and sensitised with the corresponding antitoxins until an autogenous vaccine had been prepared.

Colonel WARING agreed in the main with the contentions of Major Swan. His experience had led him to prefer early excision and free drainage, with efficient flushing, to primary incision and excision at a later date. Speaking of the muscular power which might follow excision of joints, he recalled a case of a man whose elbow-joint had been excised in pre-aseptic days, but who had subsequently been able to carry on his work as a blacksmith.

Mr. RAYMOND JOHNSON spoke of the unsatisfactory results from treatment by incision, drainage, and flushing alone in the early stages, and thought that Major Swan had made out a case for his method which demanded for it a satisfactory trial. It was desirable, he thought Major Swan would admit, to excise the ends of all the bones entering into the joint, whether all were damaged or not. In two cases under his observation where this had not been done the results had not been good.

Dr. HELEN CHAMBERS said that observations which she had made at the Women's Military Hospital, Endell-street, had shown that irrigation by solutions into septic wounds only rendered the surface sterile when one of two solutions was used—eusol or Dakin's solution. Even then the result was only temporary. What was needed was some application the effect of which was continuous. Such could only be applied in the form of a paste. The bismuth-iodoform paste satisfied the condition and had proved very useful.

Major SWAN, in his reply, agreed that excision of all the ends of bones was desirable provided that the gap produced was not unduly wide (wider than two fingers' breadth). He had not found any one solution of greatest value, but favoured a change from one solution to another. He was not convinced of the usefulness of bismuth-iodoform paste, having met with failures where he had to remove it, and had found the surrounding tissues contained many organisms.

ROYAL ACADEMY OF MEDICINE IN IRELAND.

SECTION OF OBSTETRICS.

Pneumonia in the Puerperium.—Backward Displacement of the Uterus.

A MEETING of this section was held on March 2nd, Dr. GIBBON FITZGIBBON, the President, being in the chair.

Mr. SPENCER SHEILL read a paper on a case of Pneumonia in the Puerperium. The patient developed a mammary abscess, which was opened on the eleventh day. Up to the ninth day her temperature was normal. After the operation double septic pneumonia set in, from which she died six days later. There was no evidence of septic infection elsewhere than the breast. The principal point of interest was the origin of the pneumonia.

Dr. R. D. PUREFOY said it appeared to him that the breast condition was a local evidence of a general septic condition, which developed with accelerated speed after the abscess was treated. Rokitansky and McClintock had recorded cases of puerperal sepsis, attended with suppuration in the breast.

Dr. BETHEL SOLOMONS considered that the case was probably one of embolic pneumonia, secondary to the mastitis. He regretted that Mr. Sheill had not attempted to obtain a culture from the mammary pus or from the uterus, as an autogenous vaccine might have helped in treatment.

Dr. H. C. DRURY showed charts of patients who had developed pneumonia during pregnancy. The prognosis was, he said, favourable for the mother and bad for the child, as premature labour often occurred. Labour had a beneficial effect on the disease.

Mr. SHEILL, in reply, stated his belief that septic emboli from the breast caused the trouble, and that these were admitted to the circulation by the use of Bier's apparatus, which created such powerful suction as to rupture some small veins, and that when the pressure was released septic matter was drawn into these veins. He suggested that suction treatment was fraught with danger in cases where the abscess did not freely communicate with the surface.

Dr. ALFRED SMITH read a paper on the Operative Treatment of fixed Backward Displacement of the Uterus.

Reviews and Notices of Books.

Glaucoma: A Handbook for the General Practitioner. By ROBERT HENRY ELLIOT, M D. Lond., F.R.C.S. Eng., Lieutenant-Colonel I.M.S. (retired). London: H. K. Lewis and Co., Limited. 1917. Pp. 60. Price 3*s.* 6*d.* net.—Lieutenant-Colonel Elliot has written a short but clear account of glaucoma, excellently illustrated. He deals successively with the anatomy of the parts concerned in glaucoma, the intraocular pressure, the pathological anatomy, causes, diagnosis, signs and symptoms, and treatment of the disease. He has addressed the general practitioners, but whether these readers will find the help they require is in our opinion doubtful. The book is written from the specialist's point of view, and insufficient guidance is given as to diagnosis, which is, after all, what the general practitioner wants. For example, he should be instructed minutely as to the distinction between iritis and glaucoma, yet the only reference to iritis in the whole book occupies less than three lines. In spite of the usual warnings as to the use of mydriatics the author says, on p. 51, "there are cases in which the bold use of atropine or of eserine, selected according to the exigencies of the individual case, may prove invaluable." The exigencies which demand the use of atropine are by no means precisely stated, and the general practitioner will gain little help from such statements. Neither will he be much the wiser for brief accounts of all the modern operations for glaucoma, several of which have been practically abandoned in England. We agree with nearly all that Lieutenent-Colonel Elliot says in his book, which none the less appears to us to fail somewhat in the object for which it was written.

Collected Papers on Circulation and Respiration. Second Series. Clinical and Experimental. By Sir T. LAUDER BRUNTON, Bart. London: Macmillan and Co. 1916. Pp. 719. Price 5*s.* net.—Brunton did not live to see the completed publication of his collected papers on Circulation and Respiration. This second volume is a large one, containing 68 articles with 256 illustrations covering a period from 1883 to 1915. The last article on Functional Diseases of the Arteries was published in our columns in July, 1915. Some of the articles, such as that "On Posture and its Indications," are almost classical in their familiarity; all give evidence of Brunton's chiefest aim in life to leave therapeutics as a science, instead of merely an art as he found it. This volume is not merely a monument of hard thinking, but also a token of the success of his aim.

Minor Surgery and Bandaging (Heath and Pollard). For the Use of House Surgeons, Dressers, and Junior Practitioners. By H MORRISTON DAVIES, M.D., M C.Cantab. Sixteenth edition. London: J. and A Churchill. 1917. Pp. 476. Price 8*s.* 6*d.*—Three years ago this 55-year old manual was successfully remodelled with a view to modern requirements. A chapter has now been added on the general principles of treatment of gunshot wounds of the limbs. The author states in his preface that it would be impossible to deal generally with the whole subject of military surgery without materially altering the scope and character of the book. We think that in the next edition this will have to be done, as the surgical lessons of the war are not long to be kept in a water-tight compartment, but will have their influence on every department of peaceful surgery.

The Microscopy of Vegetable Foods. By ANDREW L. WINTON, Ph.D., with the collaboration of Dr. JOSEF MOELLER and KATE BARBER WINTON, Ph.D Second edition. With 635 illustrations London: Chapman and Hall, Limited; New York: John Wiley and Sons, Inc. 1916. Pp. 701. Price 27*s.* 6*d.* net.—The increasing number

of publications on the microscopy of vegetable foods may be welcomed as likely to be helpful in the detection of fraud. The pioneer work in this direction was largely done in THE LANCET Analytical Commission, which in the "seventies" exposed, by means oftentimes of the microscope alone, the extent to which the adulteration of foods was then practised. This exposure subsequently led to legislative steps being taken which are now embodied in the present Sale of Food and Drugs Acts in this country. The authors of this large volume have taken considerable pains to produce a work of value, and its text and the illustrations will give assistance to analysts and others in this country as well as in the United States. The chapters on histology and morphology are the best features of the book, but now and again the illustrations are not as well drawn as they might be, and the context here and there is meagre and scrappy. A good deal of ground is, however, covered, and the copious references to literature serve a useful purpose.

X Rays. By G. W. C. KAYE, M.A., D.Sc. Second edition. London: Longmans, Green, and Co. 1917. Pp. 285. Price 9*s.*—We welcomed the appearance of this authoritative book when it first appeared three years ago. The present edition has been revised by the author, as far as his military duties permit, up to the middle of 1916. A chapter on X ray equipment and technique has been added by Mr. W. F. Higgins. Accurate in presentation and attractive in style the book will continue to achieve its purpose.

Sewerage: The Designing, Construction, and Maintenance of Sewerage Systems. By A. PRESCOTT FOLWELL. Seventh edition, revised and enlarged. London: Chapman and Hall, Limited; New York: John Wiley and Sons, Inc. 1916. Pp. 540. Price 12*s.* 6*d.* net.—This book illustrates with a wealth of detail the way in which the problems of sewage engineering and disposal are being attacked in the United States. It deals fully with the important question of practical sewer construction, and is divided into four parts, the first devoted to designing, the second to construction, the third to maintenance, and the fourth to disposal. The question of utilisation does not appear to have come any nearer a practical issue in the United States than it has done in this country. In fact, the writer says, speaking of chemical treatment and precipitation methods, "no method has yet been found by which the fertilising values of sludge can be made use of to sufficient advantage to induce farmers to use it even when it is given them free of cost, except in a few cases." The author then refers to the sludge ships which convey the sludge from the London sewage works 50 miles out to sea and dump it there. The book will be valued by engineers engaged in this important branch of sanitary science and to some extent by chemists, the appendix containing a useful account of the analytical methods employed in testing sewage, and a short bacteriological section on the examination of effluents in regard to bacterial reduction.

Essentials of Physiology. By F. A. BAINBRIDGE and J. ACWORTH MENZIES. Second edition. With 173 illustrations. London: Longmans, Green, and Co. 1916. Pp. 478. Price 12*s.* 6*d.* net.—This is the second edition of a companion volume to the "Essentials of Histology" (Schäfer), of "Morbid Histology" (Grünbaum), and of "Chemical Physiology" (Halliburton), and maintains the high standard of the series. Although avowedly written with the primary object of meeting the requirements of the medical student preparing for a pass examination, it is in no sense a cram-book, and no one can read it carefully without gaining a useful insight into the whole field of modern physiology. The book is indeed remarkable for its even and adequate treatment of all parts of the subject, and for the average high standard of the illustrations which are drawn from many sources. The text is clear and interesting to read.

Some Modern Methods of Ventilation, with Special Reference to Public Buildings. By R GRIERSON. With illustrations, charts, and tables. London: Constable and Co., Limited. 1916. Pp. 187. Price 8*s.* 6*d.* net.—While the author's point of view is largely the engineering one, it is clear that he keeps in mind the physiological considerations on which methods of ventilation must be based if they are to give satisfactory results. Thus he speaks of the "conditioning" of the air which is the most important factor in the situation, and he accepts the dictum of Dr. Leonard Hill that the physical effect upon the skin is the supremely important thing, not its chemical effect. This view has now received general acceptance, and so the conditioning of the air as regards its physical state—e.g., humidity, movement, equable temperature, freedom from dust, and so forth—is much more to the point than keeping down a carbonic acid gas contamination. As the author observes, "Even more disconcerting to the old school of hygienists must be the growing practice of American engineers to arrange for recirculation of the air many times in succession," and the washing plant is left to maintain the air of the ventilated space in a pure condition. This system, it is added, effects considerable economy in the fuel bill in cold weather, and we may take it that the authorities are satisfied that the air so treated is wholesome. The book contains much useful information on standards of ventilation, design of ducts, selection of fans, washers and heaters, specifications, test-forms, and specimen schedules for designers, which will be consulted with advantage by those approaching these questions from a practical and rational point of view.

A Hausa Botanical Vocabulary. By JOHN M. DALZIEL, M.D., B.Sc. Edin., D.T.M. London: T. Fisher Unwin, Limited. 1917. Pp. 119. Price 6*s.* 6*d.* net.—The author of this useful compilation is a member of the West African Medical Staff, and has carefully utilised his opportunities. The book is more than a vocabulary, and many descriptions of plants are given under their native names. Under *dawa*, Guinea-corn or great millet, are described some two dozen varieties of a food which the Hausa eats in the form of porridge, and to which he attributes special strength-giving properties. The medicinal plants include a small field herb of the order *Polygalaceæ*, *sa hankaki dako*, which is used in syphilis on the ground of its local reputation. At the end of the book is given an index of genera and of popular names.

New Inventions.

AN IMPROVED CRUTCH.

ANY improvement in the construction of crutches will no doubt be welcomed at the present time. A crutch made of the ordinary ash sticks is shown in the diagram fixed at the lower end into a piece of hard wood curved at the base and shod with rubber (which I shall call the roller), and screwed to a block fixed below the handle. The handle is fixed by a bolt and fly-nut and can be adjusted to suit any length of arm. The head is of the bridge type, the webbing stretched across being tubular and stuffed with horse-hair. Attention may be drawn to the use of the roller at the foot, by which the rate of progression is materially increased and the pressure on the axilla is reduced. As compared with the ordinary type of crutch the pace is increased, at each step, by the length of the arc of the circle taken by the roller. This arc has been fixed at about 11 inches or less as being easily accommodated in railway trains, omnibuses, and other places where space is important. The most serviceable curve is the arc of a circle having a radius of 2 or 3 ft. An important feature is the reduction in the tendency to skid on slippery surfaces.

The new crutch has its defects: it cannot be shortened so easily for use by a smaller man, it is heavier than the ordinary form of crutch, and it is a little more costly to produce. The extra weight is probably the only defect which will not in time be remedied, and even this is largely compensated by the improvement in the balance which renders it more easily controlled.

Mr. George E Healing, 3, Wilton Crescent-mews, Belgravia, is the inventor, and the makers are Messrs. Allen and Hanburys, Wigmore-street, W.

Wimpole-street, W. C. A. JOLL, F.R.C.S. Eng.

THE LANCET.

LONDON: SATURDAY, APRIL 7, 1917.

Radiation in Malignant Disease.

As old diseases are abolished or brought under control, new ones arise or new aspects of disease which were previously overlooked. But cancer remains with us in spite of half a century of special hospitals and many years of intensive research, and the new Ministry of Public Health when instituted will find no task of greater difficulty or importance than to deal with malignant disease in all its forms. Recent work with radium and the X rays in cases of malignant growth has begun to raise some hopes of a possible solution in this direction. That we have in these sources of radiation a powerful ally in the war against malignant disease is now very generally admitted, but it cannot be said that it is being employed as yet to an extent justified by our present knowledge. The reports and the paper by Captain A. A. RUSSELL GREEN published elsewhere in this issue will serve to call attention to what is now actually being achieved, and a careful examination of the results attained by the workers in Edinburgh, Manchester, and Birmingham must, we think, go far to convince even the most sceptical of the value of the methods employed.

The site of the growth naturally has a material influence on the treatment. It is more or less an axiom among radiologists that the more superficial the lesion the more likely is it to be benefited by any form of radiation, and the high percentage of successful results in the treatment of rodent ulcer illustrates this clearly. Difficulties increase in direct proportion to the depth to which the disease has invaded, the deeper structures, and modifications in technique are required on this account. A study of the cases given in the reports from Edinburgh and Manchester especially shows that some measure of success has attended the efforts to overcome these difficulties. The burying within the growth of tubes containing either radium or its emanation has produced excellent results, and this method holds out possibilities of permanence, since the base of the growth, from which metastasis arises, is attacked concurrently with its more superficial parts. A further and a logical application of the principle here involved would indicate the removal of the more superficial parts of a malignant growth in order that the base may be more efficiently attacked. The remarkable control of the X rays and radium over fungation removes the surgeon's most serious objection to operating under these circumstances, and is a further argument for a still closer coöperation between the surgeon and the radiologist than exists at present.

The choice between radium and the X rays in dealing with cases of malignant disease is still in the stage of discussion, and it is doubtful if any good purpose could be served by advocating one at the expense of the other. Each has its advantages as well as its disadvantages, and they have much in common. The difficulty of obtaining radium in any quantity makes it rare, but its scarcity is compensated for largely by the constancy of its output—a condition that has greatly facilitated the development of radium therapy. In contrast with the irregularity of the output from the X ray tube radium itself gives us a profuse supply of radiation easily and cheaply obtained. This drawback to the use of X rays is, however, materially reduced in the latest form of tube construction. Indeed, as a result of the introduction of the Coolidge tube it is not impossible that X ray therapeutics will undergo very considerable modifications. Whichever method, however, is being practised, certain points have already emerged with more or less certainty, and the most important of these is the danger of delay. Every day's delay diminishes the patient's chances of complete recovery, and this principle applies particularly to operable cases. However favourable a case may appear, no surgeon can be sure that he has removed every trace of malignancy, or, indeed, that he himself has not scattered malignant cells over the field of operation. Nothing should be left to chance, and as prophylactic radiation involves no necessity for disturbing the dressings or the patient, it should be commenced the day after operation. Another important matter of general agreement is that within reasonable limits long applications are preferable to short ones. Perseverance, too, is a scarcely less powerful factor for success. Many patients needlessly throw away months or years of useful and comfortable existence through failure to follow the advice that is given them. In the light of the experience hitherto gained it is not too much to say that a good case has been made out for the use of some form of radiation in the great majority of malignant cases, and that its more general employment will have a favourable influence on their prognosis.

The Departmental Committee on Approved Societies and National Insurance.

THE Departmental Committee which has had the finance of Approved Societies under its consideration in connexion with the part played by them in National Insurance issued an Interim Report in May and a Further Report in October, 1916, bringing its labours to a conclusion with a Final Report in February of the present year. The Committee was asked by the terms of its reference, it will be remembered, to report upon any amendments in the financial scheme of the National Insurance Acts which experience of the administration of sickness, disablement, and maternity benefits might suggest to be desirable. The amendments to be considered would, it was thought, necessarily be within the limits of contributions and benefits as they now stand and apart from

further grants by the Exchequer, although last week's resolution proposed by Mr. KINGSLEY WOOD, a member of the National Insurance Advisory Committee, at a conference of Approved Societies, foreshadowed a substantial increase in maternity benefit as part of the expected infant welfare legislation. Further, the Committee was asked to make recommendations as to how far amendment of the National Insurance Acts and of the regulations made under them might simplify the work of the Societies and reduce its cost without detriment to the interest of the insured. The subject of the inquiry was therefore strictly limited to criticism, and to proposals having for their object the effecting of improvement under existing conditions or under conditions not radically altered, in matters connected with the finance and administration of Approved Societies.

In the two reports issued last year the Committee dealt with a variety of subjects intimately affecting Approved Societies and their finances, and suggested means whereby it seemed that a substantial measure of simplification in the machinery of the Acts and regulations might be secured. It was of the opinion, as stated in the report issued in October, 1916, that in the circumstances in which the Approved Societies were called upon to take part in National Insurance it would be neither fair nor reasonable to expect in the earliest youth of a newly devised system a simplicity and smoothness of working equal to that already established by the Friendly Societies after long experience in the conduct of their usual affairs, and it was predicted that whatever changes might be brought about as the result of experience, compulsory insurance upon the lines with which we are now becoming familiar must necessarily remain a highly complicated and intricate part of our social machinery. The report neither supported the views of those who complain that the Acts are too cumbrous and complex in character, nor did it express any expectation that its own deliberations would have as a result the cessation of complaints along the familiar and often reasonable lines. Those interested in the aspects of State insurance which present themselves to, and concern the Societies will, of course, study the reports as published. If they are technical they are carefully confined to elucidating the essential features of the matters dealt with, which are not always those which concern the medical profession as a whole, closely associated as that profession is with the working of National Insurance. The question of paying sickness and disablement benefit in respect of illness due to venereal diseases is, however, one matter in which the medical profession is deeply interested, as the stewards of the public health of the country rather than in the rôle of pathologists. The Committee recommends in its Final Report that, having regard to the danger to the community in the case of the person affected by venereal disease, Societies ought so to alter their rules as to enable benefits to be paid to a class of sick and disabled persons who hitherto have been excluded from them. The suggestion has everything to commend it, as is reflected in the opinion of all intelligent laymen. The sick person of the class which depends upon a Friendly Society for maintenance when wages cease on account of inability to work has a better chance of recovery when he is able to draw a weekly sum for his sustenance than he has if cessation of work means complete loss of income. He is also more likely, if he can draw sickness benefit without hindrance or comment and as a matter of right, to take effective steps towards regaining health in the early stages of illness. His recovery will remove a source of danger to other members of the community, and the prevention, or, failing this, the prompt treatment of his disease, is a matter now rightly recognised as one of national importance. At the same time, the alteration of the rules of a body of contributors to a common fund, in order to allow payments to be made to a class which was expressly excluded from participation in that fund when those contributors agreed to subscribe to it, presents some difficulty. The objections of those who will oppose any such change as that indicated will not necessarily depend upon sentiment or prejudice due to the association of venereal diseases with avoidable acts of immorality. They will be founded upon the entry of subscribers into a contract under conditions which it is proposed to alter to their detriment, a possible compensation being offered to them dependent upon the acquisition of a disease from which they may see no prospect of suffering. How far the opportunity to benefit the community by helping to diminish the prevalence of venereal diseases may appeal to persons thus situated will be tested if the recommendation of the Departmental Committee is sought to be adopted in any particular society, but the objectors will certainly occupy a strong position. Another question of equal or greater importance, financially and otherwise, to the Societies and their members is that of the payment of sickness and disablement benefit in the case of tuberculous disease during the period of after-care. As to this, the Committee refers to the existence of a national scheme, liberally assisted out of public funds, for the treatment of the whole community, including the uninsured and the insured. In view of this, the Committee did not feel justified in asking that the Societies should undertake a fresh burden. They had it in their power to render material assistance and to develop their policy so as to facilitate the promotion of useful experiments in "the wider field of public health," and beyond this they should not be asked to go. A third question, connected with the public health side of National Insurance, relates to inquiries into the causes of excessive sickness. As to this, the Committee pointed to the examples before it of the segregation of insured persons into societies of distinctive occupational hazard, and advised that the Insurance Commissioners, before any inquiry of the kind referred to was held, should satisfy themselves that a *prima-facie* case for holding it had been made out.

With reference to the Further Report of the Committee made last October, we are reminded,

while dealing with the Final Report, that the former contained a useful recommendation affecting hospitals and the duties of Approved Societies towards them in respect of payments. The bulk of the Further Report, as we have said, was concerned with finance, and was of interest mainly to the Societies themselves, but the recommendation referred to dealt with contributors who are hospital in-patients, and to the inability of Approved Societies to pay benefit to any member for his own direct personal benefit while an inmate of an institution. The Further Report of the Committee advised that payment should be made to the dependents, if any, of a patient in a hospital or institution if he should so desire, and that in the case of a patient without dependents money otherwise due to him should, on his authorisation and at the discretion of his society,

(*a*) Be utilised, in whole or in part, to defray any expenses otherwise than in respect of treatment or maintenance, for which he may be, or become, liable while he is in the institution; or so far as not so utilised, (*b*) be paid over to the authorities of the institution (not being a Poor-law institution, or other institution maintained out of public funds) under an agreement entered into by his society, either generally or in the particular case.

This would appear to render the contribution of an Approved Society to a hospital in respect of a particular patient dependent upon a combination of circumstances which would limit such payment to comparatively few occasions. Contributions to Insurance Committees in respect of tuberculous patients treated in sanatoriums, also dealt with in the Further Report, are on a somewhat different basis. The Committee here took the view, laid before it by some of the witnesses, that money so paid would better be devoted to helping the patient to recover complete health after discharge from the sanatorium. The three reports taken together constitute an interesting document, the very limitations of which, due to restrictions of the reference made to it, serve to remind us of the impossibility of dealing effectively and upon a large scale with many of the problems of National Insurance before war is over. Sir E. CORNWALL doubtless had this difficulty in mind when he stated in the House of Commons last Monday his intention of making the Advisory Committee to the Insurance Commissioners a more workmanlike body by reducing its numbers from 168 to 30; and his proposal to appoint a small separate medical advisory committee is also a step in the right direction.

DONATIONS AND BEQUESTS.—By the will of the late Mr. Francis Reckitt, of Beaconsfield, Bucks, the testator bequeathed £5000 each to the Great Northern Central Hospital, for their Convalescent Home, and Dr. Barnardo's Homes; £2000 to the King Edward's Hospital Fund; £1000 each to the Royal Hospital for Incurables, Putney, the Mount Vernon Hospital for Consumption and Diseases of the Chest, Hampstead, the Hull Royal Infirmary, and the Hull and East Riding Convalescent Home; £500 each to the Hull Children's Hospital and the Cancer Hospital, Brompton.—The late Miss Caroline Emma Chretien has left by will the proceeds of the sale of Nelson House, Bexley Heath, to Bexley Cottage Hospital for an enlargement of the hospital to be known as "the Chretien Wing or Ward," and from the proceeds of sale of her other real estate legacies to the Royal Blind Pension Society and Poplar Hospital for Accidents. Under the same will the London Hospital will receive Consols and stock of the value of nearly £5000.

Annotations.

"Ne quid nimis."

MODERN CARDIOLOGY.

IT is probable that the treatment of heart disorders can show a more substantial advance during the last 20 years than has been witnessed in any branch of our science since Laennec revolutionised our knowledge of thoracic disease a hundred years ago. The contributing factors to this chapter in clinical medicine, which has been ably reviewed by Dr. G. A. Sutherland in the Lumleian lectures this year, are to be traced, not only to the improved instrumental methods of examination of the heart, but particularly to the newer conceptions and clinical ideas which these methods have engendered. For a long time it happened that our knowledge of the physiology of the circulation advanced in the laboratory, while the practical application of that knowledge remained very limited. Even the introduction of the earlier graphic methods failed to realise the hopes which were founded on them. A certain scepticism was aroused as to their value at the bedside, and this attitude extended at first to the later polygraphic methods of Sir James Mackenzie. But the conditions were entirely different when Sir James Mackenzie's work began to attract the thoughtful attention of clinicians. Gaskell had by this time established the coördinating factors of auricular and ventricular action. Mackenzie perfected the means of clinically studying their respective actions, and, advancing along these lines, recognised that irregularity of the heart's action may not only be a matter of academic interest but might offer the key to the whole clinical course and character of many cardiac conditions. There had been evolved, in fact, a living pathology of the heart. Discovery followed discovery in quick succession, culminating in the final recognition of that most important condition, auricular fibrillation. The story of that condition—how it came to be identified and how its practical significance, and, above all, its response to treatment were verified—forms one of the most satisfactory chapters in clinical medicine, and was effectively detailed in our columns by Dr. Sutherland. Criticism will naturally not be wanting when some of these newer conceptions run counter to the teachings of the past, and Dr. F. J. Smith finds that Dr. Sutherland's exposition of modern cardiology defaults in not doing proper justice to the teachings, and especially the therapeutic successes, of such leaders of medicine as Gawen Sutton and Andrew Clark. We think Dr. Smith, while rightly standing out against what he considers slight of the labours of past teachers, has not appreciated the real situation. There need be no quarrel with the older school, no lack of reverence and respect for those past masters to whom we owe so much. It is the manner in which their views have been distorted by subsequent teachers which, we imagine, falls mainly under Dr. Sutherland's condemnation. Newer methods have certainly widened our views of heart disease, but in doing so they have also induced an even greater sense of our ignorance than was perhaps felt by some of the earlier teachers to whom cardiac pathology must have seemed a simpler affair than it is to-day. More-

over, if the upshot of modern learning is to confirm previous routine a great advance has been made—the advance from empiric routine, with its risks of misapprehension, to scientific procedure with its sure basis for application and modification. We do not find, therefore, Dr. Sutherland's lectures lacking in respect for anything that is vital in the teachings of his predecessors, and while mere theory finds small space in his lectures, cardiac therapeutics, as far as they are represented in the employment of digitalis, receives the careful attention which it merits, and we think that many of the older clinicians, had they been present at the lectures, would have been gratified to find their intuitions confirmed by later physiological research. Heart-block is now found to be a far from rare clinical condition, and other arrhythmias have their true place and significance in pathology. All this work has come to stay. But if one thing stands out more particularly revealed by these new methods it is this: the essential importance of clinical subjective symptoms. This later work has only heightened the significance of the patient's own feelings, his "field of cardiac response." Instrumental methods can never replace clinical bedside observation, and it is to this latter field that these Lumleian lectures are so fittingly devoted. And while we respect and have every sympathy with Dr. Smith's attitude in championing the memory of the great men gone from us, we do not think that the neglect of which he complains has occurred widely or is in evidence in the last Lumleian lectures.

MIGRATION OF SHELL FRAGMENT FROM THE FEMORAL VEIN TO THE RIGHT VENTRICLE.

IN the *Journal of the American Medical Association* of Feb. 7th Professor H. M. Lyle, of Columbia University, has reported a remarkable case observed by him when in France acting as chief surgeon of the Ambulance d'Annel, Oise. A Zouave, aged 31, was brought to the ambulance. Fours hours previously he had received a perforating shell wound of the left thigh, 4 cm. above the knee, and a penetrating shell wound of the right thigh. Radioscopy of the thigh and lower abdomen failed to reveal any foreign body. Unfortunately the upper abdomen and thorax were not examined. The failure to find the shell fragment was puzzling, as the depth and direction of the wound seemed to preclude the possibility of the particle having fallen out. The patient was in a condition of mild shock. The temperature was 97·2° F., the pulse 126, and the respiration 28. Physical examination of the chest and abdomen was negative. Contused skin was cut away, the wound was laid open, and the projectile track lightly but methodically excised. No foreign bodies were discovered. At the bottom of the wound of the right thigh the femoral vessels were found embedded in a clot; the femoral vein was bruised, but apparently intact. Two Carrel instillation tubes were inserted and 20 c.c. of Dakin's hypochlorite solution were delivered to the wound every two hours. The patient appeared drowsy and slept the greater part of the first two days. On the third day the abdomen became greatly distended, and he complained of pain and tenderness over the spleen and right kidney. The distension was partially relieved by lavage and enemas. Jaundice appeared on the morning of the fourth day, and was accompanied by pain and tenderness over the liver. The temperature rose to 102·2°, the pulse to 132, and the respirations to 32. Fine moist râles were heard at the left base. The area of cardiac dullness increased, a pericardial rub was heard, and the cardiac sounds were indistinct. A provisional diagnosis of general gas bacillus infection with pericarditis and pneumonia was made. In the afternoon there was a temporary improvement, followed by sudden death a little later. Throughout the wound remained sterile. At the necropsy the wound of the right thigh was found to be 10 cm. below and 5 cm. posterior to the anterior superior spine of the ilium. The track led forward, downward, and inward to the femoral vein. In the external wall of the vein there was a small valve-like wound sealed by an organised clot. There was no local evidence of gas infection. Both the lungs were œdematous; there was fibro-purulent pericarditis with free gas in the pericardial cavity. The heart was enlarged, and its external surface was covered with a fibro-purulent exudate. On section the heart showed gaseous crepitation. A rough shell fragment was found free in the cavity of the right ventricle, measuring 1·5 cm. by 0·9 cm. by 0·5 cm., and weighing 1·81 gm. Fibres of clothing were adherent to the irregular surface of the fragment. The liver, spleen, and kidneys were enlarged. On section all yielded gaseous crepitation. There was no obstruction to the gall-bladder or gall-ducts. Evidently the fragment of shell entered the femoral vein and thence migrated to the heart. A radioscopic examination of the chest might have revealed the presence of the shell fragment, which could have been dealt with by operation. Bullets in the cavity of the heart have already been extracted with success in the present war.

THE CLEARING OF THE PAVEMENT.

THE sanitary state of our streets is important, and considerable inconvenience is sometimes caused by the present shortage in the regular service for ensuring it. It ought not to be too much to ask householders, shopkeepers, and others to keep the pavement in front of their holdings swept. The work for each individual would entail neither much time nor energy. If such individual civic responsibility had been insisted upon last Monday in the metropolis after the heavy fall of snow the appalling state of slush on the pavements would have been prevented. As it was, the pedestrian found walking to be both dangerous and uncomfortable, and we have little doubt that a crop of minor accidents occurred through a slip on the pavement. Apart from these, the constant wading through the slush was a real ordeal for the feet, few boots appearing to be proof against its penetrative powers. The pedestrian whom the state of the pavement has cost an illness or an accident may well ask why the obvious remedy is not enforced.

ANTIMENINGITIS INOCULATION.

IN the summer of 1916 a mild epidemic of cerebro-spinal fever occurred in an infantry regiment of over 1200 men at Fredriksstad in Norway. Eight cases occurred, and as isolation of the patients and their contacts seemed ineffective in preventing the spread of the disease Dr. E. Aaser was detailed in August to make a bacteriological investigation of the epidemic. This he did by the microscopical examination of smears, stained by Gram's method, of the naso-pharyngeal mucus

of every man in the regiment. Time and the necessary facilities for any more accurate method of examination were lacking; Dr. Aaser says[1] that he isolated as meningococcus carriers all the men whose naso-pharyngeal mucus contained a large majority of Gram-negative diplococci, and regarded as "doubtful" cases those whose mucus contained a few such diplococci. He found 87 carriers and 70 doubtful cases among the men of the three regimental companies in which cases of cerebro-spinal fever had occurred; no such cases had occurred among the 280 men of the fourth company or among the 100 regimental cyclists, and Dr. Aaser discovered 40 doubtful cases among these, but no meningococcus carriers. To stop the spread of the epidemic it was decided to offer to inoculate every man in the regiment with a meningococcal vaccine. It so chanced that one of the meningococcus carriers, isolated by Dr. Aaser, developed meningitis next day and died. This fact, coupled with fear of the meningococcus carriers, induced all but two or three of the men to be inoculated. The vaccine used was a sterilised emulsion of cultures of eight or ten strains of meningococcus, containing 300 million cocci per c.c.: the dose was 1 c.c. The inoculations were carried through in ten hours. A few of the men had slight chills and headache during the night following the inoculation, but none were seriously incommoded; most had a redness and swelling measuring 3 × 5 cm. at the site of inoculation. Dr. Aaser injected himself with 3 c.c. of the vaccine without any ill-result, and a few days later took a second injection of 4 c.c. equally without any general reaction. The plan had been to give all the men a second inoculation four or five days after the first. There was some unwillingness at this point; but it happened that a general order was issued just then stopping all leave for the rest of the training in the case of those not vaccinated. So all the men received a second inoculation, the dose being 1 c.c. In general this produced more local redness but less local swelling, and a weaker general reaction than the first inoculation. No further case of cerebro-spinal fever occurred in the regiment after this vaccination, during the general autumn manœuvres; but whether *propter* or merely *post hoc* Dr. Aaser does not attempt to decide. He notes that a similar prophylactic anti-meningitis vaccination was carried out in the winter at Tönsberg, 250 men receiving three successive inoculations with 1, 2, and 3 c.c. of meningococcal emulsion, without any harmful result.

[1] Tidsskrift f. d. Norske Laegeforening, Christiania, 1917, xxxvii., 174.

THE CONSERVATION OF MILK.

THE prevention of waste would go far to solve the food problem at the present time, and one of the most promising ways of doing this is by preserving perishable foods. Liquid foods are specially liable to loss and contamination, and should therefore be desiccated. Methods which in the past have been found wasteful may well now prove to be economical in view of shortage and advanced prices. We shall soon arrive at the period of the year when the maximum output of milk is reached, and the waste of this valuable fluid food material is notorious. Its preservation by concentration with the addition of sugar is already severely handicapped by the shortage of the preservative itself, besides which the milk-syrup so produced is not ideal for general food purposes. Milk, of course, can be concentrated without the addition of sugar, but the product cannot be said to be satisfactory, as it is very liable to chemical changes, involving, for example, the precipitation of its milk-sugar and of calcium salts, chiefly in the form of citrate. The desiccation needs to be carried a step further and the whole of the water removed. But there are two difficulties about the complete drying of milk. The first is that if too high a temperature is employed the constitution of the milk is seriously disturbed: the albumins are coagulated, enzymes are destroyed, the fat is separated, and the resulting powder does not re-form an emulsion with anything like the appearance and character of milk. Nevertheless, the product thus obtained possesses a high nutritive value and would save much waste of useful food, particularly in the summer. The water can, however, be easily withdrawn from milk by another process, which consists first in concentrating the fluid at a low temperature in a vacuum pan and then forcing the concentrated milk through a spray producer into a capacious chamber through which flows a current of warmed air. The moisture is thus carried away and a fine dry powder falls, which may be swept out. This product amalgamates perfectly with water, the fluid tasting like fresh milk and having exactly the appearance of the natural emulsion. Moreover, it still shows enzymic activity, the albumins are uncoagulated, the fat is not separated, and caseinogen is still present in unaltered form. But by whatever process dried milk powders are made one great trouble arises: sooner or later the fat deteriorates, becoming partially rancid, and giving the product a repulsive flavour and smell. Even skim milk, retaining as it invariably does a small proportion of fat, deteriorates in the same way sufficiently to make it distasteful after a time. If this problem could be solved there would be no longer any reason for employing fluid milk at all and an enormous economy of valuable food material would be gained. We could then, so to speak, keep the cow in the larder to be drawn upon exactly as domestic necessity arises. The resulting revolution in the supply and distribution of milk would bring substantial gain to the community on many counts.

Dr. Frederick Taylor was re-elected President of the Royal College of Physicians of London on Monday last.

AT the Harveian Society of London, Stafford Rooms, Titchbourne-street, Edgware-road, W. 2, on April 19th, at 8.30 P.M., Dr. P. J. Cammidge will read a paper on the Treatment of Diabetes by Alimentary Rest.

LEICESTER ROYAL INFIRMARY.—The 144th annual report states that during the year 1916 the number of adult in-patients admitted to the civil wards was 2888, as compared with 3082 in the previous year, and of children 545 compared with 616. To the military wards 571 patients were admitted during the year compared with 692 in 1915. The average number of beds occupied was: 190 (civil) and 85 (military). Although the expenditure for the year was heavy—namely, £31,855—it had been met by a generous increase in the ordinary income, the year closing with a small credit balance. The report urges the need for a new pathological department at an estimated cost of £5000 or £6000.

A RECORD OF
61 CASES OF NEOPLASMATA OF THE SKIN TREATED BY X RAYS OR RADIUM.[1]

BY A. A. RUSSELL GREEN, M.B., B.S. LOND., M.R.C.S.,
CAPTAIN, R.A.M.C. (T.); RADIOGRAPHER TO THE FIRST SOUTHERN GENERAL HOSPITAL AND TO THE BIRMINGHAM AND MIDLAND SKIN HOSPITAL.

THE neoplasmata of the skin here reported are all of a malignant character. The writer caused to be circularised every case of this nature which had attended the Electrical Department of the Birmingham Skin Hospital during the last four years, and in the results here set down there has been no selection of cases, some indeed coming for treatment with the knowledge that no permanent benefit could be expected. To 61 inquiries, 41 replies were received, the majority reporting in person.

Table I.—This group of cases, 27 in number out of the 41 whose final history I have traced, represents the cases that have completely healed, two only having relapsed at a later period. Nos. 1 to 20 have been treated with radium. Nos. 21 to 23 have been treated with X rays, and Nos. 24 to 27 have been treated with X rays and radium. With the exception of No. 17, which is Paget's disease of the nipple, and No. 27, which is epithelioma, they are all cases of rodent ulcers. It is a notable feature in this group that in only three instances has any method of filtration been employed. No. 16 was filtered through 0·25 mm. of aluminium and Nos. 21 and 23 through 0·75 mm. of aluminium. It was also noticeable that while in some cases reaction was brought about by the treatment, in others it was absent, and in No. 26, which had several marked reactions under X rays, no improvement took place until radium was applied, and I consider reaction as an incidental rather than an essential part of the curative process.

The view once held that X rays act purely through their destructive effect on the tissues is untenable, as anyone who has seen treatment of ringworm by this means will realise.

One of the points upon which I desired to get evidence was as to whether in cases treated with radium small frequent doses or larger doses at longer intervals were more efficient. An examination of Table I. shows that where the initial exposure was over half an hour, the average duration of treatment was 5⅓ months, while in those in which it was half an hour or less, the average was 10 months. Of the nine cases treated with small doses six refused to heal until applications varying from three-quarters of an hour to six hours were given; the other three healed under the smaller doses, two have remained healed, the third has relapsed. These three cases healed within three months.

The other case in this group (No. 18) which relapsed was treated by hourly applications of radium, increased later to six hours, and healed in six months. After the relapse the patient was placed under radium treatment again, and while being so treated was painted with liquor hydrarg. nitrat. acid. (not by me), a proceeding which I feel prejudiced his recovery. He is now attending the Radium Institute, and writes to say that his case is considered to be hopeful.

Cases treated by X rays.—The following three cases were treated by X rays:—

No. 21 had pastille doses until she reacted, five such doses in six weeks.

No. 22 had small doses of X rays.

No. 23 had half-pastille doses thrice weekly, 30 applications in all, and in the latter stages of her treatment filtered through 0·75 mm. of aluminium.

Cases treated by radium and X rays.—In all these four cases the essential curative agent has been radium.

No. 24 was treated with small doses of radium 12 minutes thrice weekly, healed in five months, and was given a prophylactic dose of X rays.

No. 25 was treated with X rays for four months without improvement. She was then put on 1-hour doses of radium, and after 16 applications the ulcer healed.

No. 26 was treated with pastille doses weekly, several marked reactions taking place, but no healing resulting. The case ultimately cleared up after the application of radium in ¼ to 1-hour doses.

No. 27 was a case of epithelioma of the hand in a man aged 76. This case attended for two and a half years, and the lengthy period of attendance was due to the difficulty experienced in healing the simple ulcer left after the treatment; healing was finally brought about by the application of silver nitrate.

Table II.—Traced unhealed cases.—Of the eight cases treated by radium, three have ceased attendance.

No. 31 by order of the honorary surgeon under whom he first attended.

No. 32 was very irregular, but in any case I should write him down a failure, as he attended for more than six months without any improvement.

No. 35 was healed by X rays eight years ago but relapsed, and while being treated by radium became the subject

[1] A report to the Midland Medical Society.

TABLE I.—TRACED HEALED CASES.

No.	Age.	Duration of ulcer (years).	Treatment.	Duration of treatment (months).
			Radium.	
1	49	12	97 hrs. 3 to 6 hrs. each.	8
2	63	1	8—6 hrs. 1—8 hrs.	9
3	60	2	4—3 hrs. 8—6 hrs.	3½
4	79	2/12	4—½ hr.	2
5	40	1	4—2 hrs. 4—½ hr.	5½
6	69	¼	32 hrs. 20 mins. to 3 hrs.	12
7	70	1/4/12	7—1 hr.	1
8	66	¼	12 mins. thrice weekly.	3
9	80	2	8½ hrs. 5 to 60 mins.	7
10	60	3	9—6 hrs.	6
11	51	5	6—1 hr.	1
12	66	20	10½ hrs. 10 to 45 mins.	5
13	43	1	16 hrs. 1 hr. thrice weekly.	2
14	49	12	3—6 hrs. 2—4 hrs. 2—1 hr. 1—2 hrs.	3½
15	42	5	12 hrs. 5 to 60 mins.	30
16	42	6	1—3 hrs.	5
17	49	2/12	143. ½ to 6 hrs.	24
18	47	—	1—6 hr.	6
19	60	17	2½ hrs. 5 to 15 mins.	3
20	59	—	4 hrs.	9
			X Rays.—Pastille Doses.	
21	35	3	5 P.	1½
22	77	15	2½ P.	2
23	68	5	15 P.	4
			X Rays and Radium.	
24	69	2	1 P. 12 mins thrice weekly	5
25	50	4	26 P. 16 hrs. radium.	18
26	62	20	30 P. 12½ hrs. radium.	33
27	76	30	3½ P. 128 hrs radium.	9

TABLE II.—TRACED UNHEALED CASES.

Note.—In the columns headed "Treatment," where the sign — separates the figures, the first figure indicates the number of applications, and the second figure the duration of such application.

No.	Age.	Duration of ulcer (years).	Treatment.	Duration of treatment (months).
			Radium.	
28	70	10	9 hrs.	1
29	70	3	3—2½ hrs.	2
30	58	3/12	4 hrs.	3
31	55	9	2—1½ hr.	2
32	38	9	37—½ hr. 4—6 hrs. 1—10 hrs.	13
33	53	—	4 hrs.	3
34	73	—	4—¼ hr. 1—12 hrs.	2
35	51	15	Short exp. thrice weekly.	4
			X Rays.—Pastille Doses.	
36	72	1	3½ P.	8
37	47	—	12 P.	3
38	69	17	4—½ P.	4
39	48	—	9 P.	2½
			X Rays and Radium.	
40	72	12	2 P. 92 hrs. radium.	22
41	62	10	3 P. 51 hrs. radium.	17

TABLE III.—UNTRACED CASES, LAST NOTE HEALED.*

No.	Age.	Duration of ulcer (years).	Treatment.	Duration of treatment (months).
			Radium.	
42	55	5	5—6 hrs.	3
43	74	3	5½ hrs. 10 mins thrice weekly.	7
44	60	4½	39—1 hr.	19
45	—	2	3½ hrs. 10 mins. to 1½ hrs.	2
46	64	6	96½ hrs.	28
			X Rays.	
47	—	4	9½ P.	4
48	34	1	9 P.	11
			Radium and X Rays.	
49	69	2½	3 P. 6½ hrs. radium.	2
50	51	1½	50 P. 6 hrs. radium.	19
51	59	9	17 P. 3 hrs. radium.	12
52	47	10	18½ P. 86 hrs. radium.	—
53	57	9	10 P. 9 hrs. radium.	25

* The remaining 8 of this group have no note as to final condition.

TABLE IV.

Of all cases that can be traced 66 per cent. are healed, and have remained healed for the following period:—

Between 3-4 years ...	7	Under 1 year	4
Between 2-3 years ...	4	Relapsed	2
Between 1-2 years ...	9		

Of those treated by:—

Radium	70% healed.
X rays	43% ,,
Radium and x rays	66% ,,

No. 17 was diagnosed as Paget's disease of the nipple; No. 27 as epithelioma of the wrist. All other cases in this table were diagnosed as rodent ulcer.

of general enlargement of the lymphatic glands without characteristic blood changes, and ceased to attend.

Of the five still attending, No. 28 is making satisfactory progress. No. 29 is nearly healed.

No. 30 is of some medico-legal interest, especially to radiologists. She is 58 years of age, and has had lupus as long as she can remember. Thirty-five years ago she was treated at the Queen's Hospital, Birmingham, by scraping and caustics, but has had no treatment since. Three months ago she came to my department with an epithelioma arising within the lupus area. Had this case been treated by X rays or radium it would have been cited by the critics of these methods as being due to the treatment. The prognosis is bad in cases of epithelioma arising in lupus, very rapid growth resulting, doubtless due to the high vascularity of the parts.

No. 33 is progressing satisfactorily, and No. 34 is a case too deeply involved to expect any result in treatment.

Of the four cases treated by X rays, No. 36 is improving.

No. 37 is attending the General Hospital, Birmingham, and writes that he is getting much benefit from radium treatment.

No. 38 died from apoplexy during treatment.

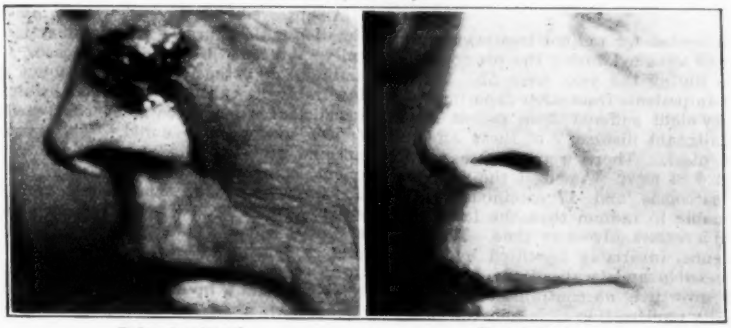
No. 39 is a chronic alcoholic and ceased attendance after two and a half months.

Of the two cases treated by X rays and radium, No. 40 shows that improvement is possible even with such extensive involvement of the deeper tissues.

No. 41, a very extensive case with cicatrisation round the edges, complained of such intense pain after treatment that, having regard to the bad prognosis, I told him to cease to attend.

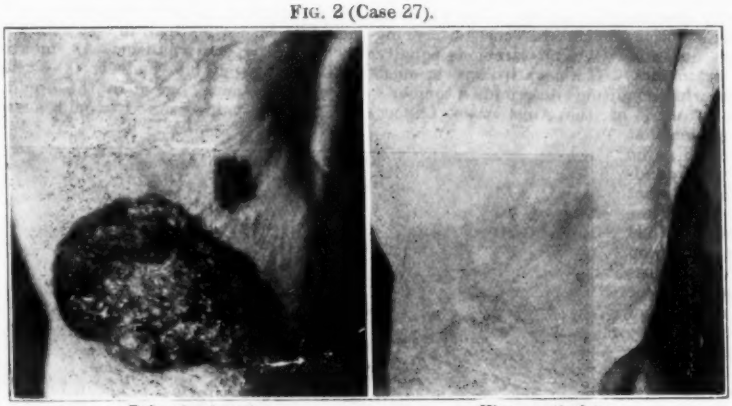
Table III.—Untraced cases.—I have not discarded the 20 untraced cases, but by examining the out-patient records (facilities for which were courteously placed in my way by the honorary surgeons) I was enabled to arrive at some conclusions concerning them, 60 per cent. being healed. This corresponds pretty nearly with the figure obtained in the traced healed cases which is 66 per cent. Of the unhealed group four were in an advanced stage of epithelioma when they first attended, the other cases on the table being rodent ulcers.

FIG. 1 (Case 10).



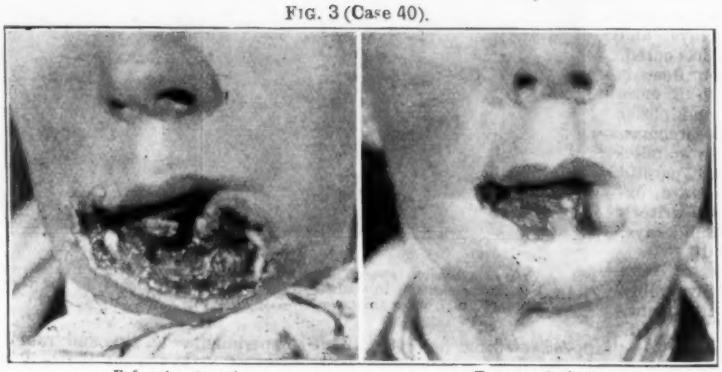
Before treatment. Six months later.

FIG. 2 (Case 27).



Before treatment. Nine months later.

FIG. 3 (Case 40).



Before treatment. Ten months later.

Method of dosage.—The radium in use is pure radium bromide, and is certified as such by the Curie Laboratory. It is spread on metal plates in the proportion of 5 milligrammes to each square centimetre of surface. The X rays were employed as full or fractional Sabouraud doses, this being the quantity of X rays required to bring about the fall of the hair of the scalp without visible reaction, or permanent injury to the hair follicles, and is a sharply defined dose.

Supplementary treatment.—I have found two methods of supplementary treatment useful. (*a*) Electrolysis for the small nodules that are sometimes left at the periphery of the scar, and which are liable to become centres of subsequent relapse, has proved much more useful to me than the application of carbonic acid snow; in case No. 27, concurrently with the first exhibition of radium, I transfixed the base of the epithelioma with an electric needle in some half dozen places. (*b*) Autogenous vaccines, in cases that have been obstinately septic, I have found of great value.

Table IV. shows the periods for which the patients have remained healed.

Conclusions.

To draw conclusions from so limited a number of cases is, I know, liable to mislead, but so far as these cases go they appear to demonstrate or illustrate that:—

1. The administration of radium in less than one hour doses of the strength specified is likely to prove unsatisfactory, although small doses of X rays and radium will sometimes bring about healing.
2. Radium will heal when X rays have failed.
3. In most superficial cases screening is not necessary.
4. Cases that are going to do well will do so within six months, and if they have not done so within that period a drastic revision of the treatment is imperative.
5. Electrolysis and autogenous vaccines are useful as supplementary methods of treatment.
6. Caustics are contra-indicated.

RADIUM TREATMENT
IN EDINBURGH AND MANCHESTER.

With a Description of
A TROCAR FOR THE INTRODUCTION OF RADIUM TUBES.

ROYAL INFIRMARY, EDINBURGH.

THE following abstract of the report to the managers on radium treatment at the Royal Infirmary, Edinburgh, during the year 1916 has been sent to us for publication by Dr. Dawson Turner, who is in charge of the radium treatment at the infirmary.

Sixty-six patients attended for radium treatment during the past year, whereas 64 attended during the previous year. The total attendances during the year were 520. Of the 66 patients half were in-patients from other departments of the infirmary. Twenty-eight suffered from rodent ulcers, 25 from inoperable malignant disease, 7 of these affecting the vagina or cervix uteri. There were 7 cases of exophthalmic goitre and 4 of nævi. Amongst the malignant cases there were 8 sarcomas and 17 carcinomas. The former are more amenable to radium than the latter, and sometimes disappear in a remarkably short time. They are, in the writer's experience, invariably benefited by radium treatment, and if accessible and localised can be entirely removed. Rapidity of growth is no contraindication to the use of radium, for rapidly proliferating cells are very vulnerable to its radiation; there is, in fact, reason for believing that they are more vulnerable than cells which in morphology and growth more nearly resemble the normal. This has been brought to the writer's notice on certain occasions. This leads to the important question, "Are all sarcomas equally amenable to radium treatment?" If a negative answer must be given to this—then what conditions determine a tumour's sensitiveness? Gaarenstroom, of the Amsterdam Cancer Institute,[1] is of the opinion that the histological structure is the chief criterion and that round-celled sarcomas generally react favourably, spindle-celled less so, and polymorphous-celled least so. He bases this opinion upon an experience of 23 cases treated by the Roentgen rays. He made no use of radium and the effect of radium rays may not be quite the same as the effect of Roentgen rays. At any rate, the writer has frequently had rodent ulcers sent to him for radium treatment which have been treated unavailingly by Roentgen rays, and these rodents radium has cured. This may have been due, it must be admitted, to a more appropriate dosage and closer apposition. Myelosarcomas, lymphosarcomas, large spindle-celled sarcomas, and parotid mixed-celled tumours are extremely sensitive, in the writer's experience, to radium rays. (*Vide* Cases 1, 3, and 10.)

A case of extensive rodent ulcer in a man 60 years of age treated with radium. On the left, the condition in January, 1916, before treatment; on the right, the same case in January, 1917, after treatment.

Malignant disease of the vagina and cervix is favourably affected by radium treatment, and epitheliomas, if localised, can confidently be expected to disappear. Owing, however, to the difficulty of efficiently raying the more inaccessible portion of the growth, recurrence in these positions after a longer or shorter period of time is common. This can be again subjected to treatment, but, as a rule, less successfully than the primary growth, and this for two reasons: the one that the recurrence is probably situated in a less accessible position, as in an extension to the broad ligaments; the other that after a course of raying only those cells survive which are refractory to the rays and a recurrence consisting of such cells or daughter cells is less susceptible to attack. There is a tendency by natural selection to breed cells which are immune. The same phenomenon can sometimes, though rarely, be observed in rodent ulcers; an extended ulcer attacking perhaps bone or mucous membrane after repeated raying does not respond at all. In these cervical cases, even though there should be recurrence, the patient has greatly benefited in the meantime by the removal of pain, the cessation of discharges, and the general gain in health and strength. This gain in general health may be striking and equivalent, as some of the continental authorities have termed it, to a virtual resurrection. (Cases 6, 7, and 8.)

As observed in last year's report, rodent ulcers require no detailed notice, for the beneficial action of radium is generally admitted. Uncomplicated cases situated on the skin and not too extensive for the amount of available radium invariably do well. If they recur, which may be due to an insufficient primary treatment, they easily yield to a second course and remain cured. The cosmetic result leaves nothing to be desired, and there is scarcely any subsequent contraction of the skin. The case figured is a good illustration of this. They are less amenable when situated on mucous membrane. Though a single strong application may suffice to remove the rodent, the writer prefers, when it is possible, to divide the necessary dose into two or three administered at three or four days' interval. It is important, in order to prevent a recurrence, that the deeper parts as well as the superficial should receive adequate treatment.

Seven cases of exophthalmic goitre, five females and two males, received radium treatment. All benefited save one, an acute case, who died, in less than a month after the treatment, of hyperthyroidism. As mentioned in last year's report, indisputable benefit is occasioned without any necessary obvious change in the organ, though generally it is diminished in size. I would again draw attention to Rave's experiments[2] on cats and rabbits. He administered large doses of X rays to the thyroids of these animals, and found from subsequent histological examination that no recognisable changes had been produced. Confirmatory results have been obtained by others. It appears, then, that in the thyroid gland we have a structure which, so far as histological examination can carry us, is refractory to X rays. Yet there is ample clinical evidence of the beneficial effects of irradiation in exophthalmic goitre.

The following are brief notes of the more important cases treated except rodent ulcers, which have been purposely

[1] Archives of Radiology, December, 1916.

[2] Vide Colwell and Russ, Radium and the X Rays, p. 212.

excluded. Reference has also been made to one or two old cases whose progress it has been possible to follow.

CASE 1.—Myelosarcoma of temporal region involving orbital cavity in a male aged 23, recommended by Professor Gulland. Admitted Oct. 17th, 1916. Duration three years. Began by headaches and swelling of jaw. A small operation was performed to remove the swelling. Later a tumour appeared on the right temporal region. On July 7th, 1916, Professor Caird excised a fragment which was found by the pathologist to be a myelosarcoma. Professor Caird refused to operate. On admission there was a prominent swelling over the right temporal region accompanied by shooting pain, difficulty in opening the mouth, and strabismus. An X ray showed that the frontal bone and upper jaw were involved. On Nov. 1st two radium tubes were inserted in Mr. Dowden's absence by Dr. White into the growth, and external radium treatment was also begun. A total dose of 4920 mgh. was administered. In a week's time the growth had diminished in size, the headache was better, and the jaw freer. On Nov. 28th, 1916, there was no squint and no pain. Professor Gulland examined him and wrote: "I was delighted to see the patient to-day and to find that he had improved so very greatly. He looks immensely better, and I see no reason why he should not start work." On Jan. 23rd, 1917, he continued quite well.

CASE 2.—Scirrhus in a female aged 59, recommended by Dr. David Huskie. Admitted Nov. 28th, 1916. A year ago Professor Caird removed patient's left breast for scirrhus. In the line of the scar there is an ulceration with hard borders. It has been burned by Dr. Huskie three times. This ulcer was given a dose of 205 mgh. during a fortnight. A week later Mr. Jardine examined her and wrote, "Result very successful, no more need for treatment." The ulcer and hardness had disappeared. Warned patient to report herself regularly to Dr. Huskie.

CASE 3.—Recurrent sarcoma (old case) in a female aged 49, recommended by Dr. Maclagan. Duration four years. Several operations for the removal of the growth without success. Admitted by Mr. Miles on July 15th, 1915. Now a large nodular mass projecting in the left suborbital region and adherent to the maxilla. Pathological report, large spindle-celled sarcoma. As Mr. Miles considered the tumour inoperable radium treatment was commenced. By internal and external applications a dose of 5880 mgh. was given. In November, 1915, she was readmitted. There was now an ulcerating mass closing the left eye, the mass was so friable that it was difficult to keep tubes embedded, but by external treatment a dose of 5180 mgh. was given. During these applications the growth diminished markedly. On Feb. 1st, 1916, the tumour had greatly shrunk and was moveable; it had been fixed before. Patient better and stronger and can see normally. The condition had so much improved that Mr. Miles removed what was left of the growth, and further radium treatment was commenced. A dose of 4120 mgh. was given as a prophylactic against recurrence. On Nov. 23rd, 1916, the growth had disappeared, an area of dead bone was visible, the skin around healthy. Mr. Miles could detect no sign of recurrence.

CASE 4.—Sarcoma involving lower ribs on right side in a male aged 44, recommended by Mr. Dowden. Admitted May 15th, 1916. Duration about 18 months. On account of a swelling in the region indicated the patient attended the surgical out-patient department of the Royal Infirmary in October, 1915, and Mr. Jardine scraped the interior of the growth. The pathologist reported that the growth was a sarcoma. The growth never went quite away, and on April 25th, 1916, the patient was admitted to Mr. Dowden's wards. The tumour was now increasing, and as Mr. Dowden was of opinion that an operation would be an extremely severe one he thought that radium might be tried. Over the growth there was a cyst containing blood. Radium treatment was now begun. Three tubes of radium were inserted into the substance of the growth and a total dose of 7560 mhg. was administered. On June 14th there was considerable external swelling and discharge. On July 20th the external swelling was less, but there was more pain. The patient reported himself at regular intervals and appeared to be gaining strength, for on Nov. 21st, 1916, he asked permission to resume his work as a brass finisher. This Mr. Dowden permitted him to do. On Jan. 2nd, 1917, he was well and hard at work, but above the original growth there was a hard tumour mass, which Mr. Dowden had noticed before.

CASE 5.—Myeloma in a female aged 23, recommended by Mr. Dowden. History: Two years ago patient complained of a gumboil on the right side of the superior maxilla. Dr. Gibbs found a growth and recommended her to consult Mr. Dowden. The latter scraped out the cavity and the pathologist reported the growth to be a myeloma. It lay posterior to the superior maxillary bone. As a prophylactic radium treatment was recommended, a tube of radium was attached to a wire and passed up into the cavity, and a dose of 1920 mgh. administered. This was in October, 1915. In February, 1916, there was no trace of a recurrence, but when the patient reported herself in June, 1916, Mr. Dowden found that the disease had returned. On June 27th Mr. Dowden scraped out the cavity and inserted radium tubes, at first three, but on one coming out only two were kept in. A dose of 4400 mgh. was now given, more than double the dose she was given the first time. Precautions were also taken to attempt to maintain the radium in a more effective position. Very severe reaction followed with swelling and pain, which required constant opiates, the tongue and mucous membrane of the cheek being burned. In December the patient was much better, and on Jan. 2nd, 1917, Mr. Dowden could find no trace of a recurrence.

CASE 6.—Sarcoma of cervix in a patient aged 47, recommended by Dr. Barbour. Admitted July 20th, 1916. Duration one year. Complains of a bearing-down pain and some discharge. On June 26th, 1916, the cervix, found to be ulcerated by Dr. Fordyce, was curetted. Pathological report, sarcoma. Dr. Barbour examined her on July 20th, 1916, and found hard nodules all round the cervix except posteriorly. The right ligament was thickened. Body of uterus unaffected. Hysterectomy unsuitable. A dose of 4300 mgh. of radium was given. Sept. 26th, 1916: Examined by Dr. Fordyce. Condition very satisfactory, there being no trace now of the indurated nodules, but cicatrisation instead. Nov. 14th, 1916: Parts seemed quite healthy; no discharge; patient much stronger. Weight 8 st. 1½ lb. Feb. 1st, 1917: The patient was examined and the parts found to be *in statu quo*.

CASE 7.—Squamous epithelioma growing from vaginal roof behind and to left of cervix in a patient aged 63, recommended by Dr. Orr and Dr. W. Fordyce. Admitted Oct. 16th, 1916. There is a soft fungating gangrenous mass of the size of a Victoria plum occupying the above position. This was removed by operation and the base of it thoroughly scraped and pure carbolic acid applied. Pathologist report: Squamous epithelioma showing marked necrosis. Ten days later the mass had grown again to half its previous size; very foetid discharge; some necrosis. The mass was again removed and radium applied to base and a dose of 4900 mgh. administered. Jan. 11th, 1917: Dr. Orr writes, "There is to-day nothing to be felt except a cicatrix and the least suspicion of ulceration, perhaps the size of a green pea, at one point of the cicatrix. The patient feels and looks well and the result so far is very gratifying."

CASE 8.—Epithelioma of the cervix. (An old case.) Patient, aged 30, recommended by Dr. Brewis. Admitted July 6th, 1915. Complaint of loss of health and reddish-brown discharge. Cervix widely involved; uterus fixed. After curetting a dose of 6720 mgh. of radium. Sept. 30th: Patient much better. Pain disappeared. Cervical cavity smaller, granulations superficial, a scraping still showed squamous epithelioma cells. Uterus movable. In consequence of pathological report a dose of 1920 mgh. was given. Feb 3rd, 1916: Patient greatly improved, looks another woman. July 20th, 1916: Quite well. Uterus shrivelled, replaced by granulation tissue. Pathologist's report from a scraping. Nov. 16, 1916: Returned to ward complaining of continuous pain in right leg. Examined by Dr. Brewis under chloroform. Cannot feel cervix or body of uterus, but to the right there was a hard mass in the position of the broad ligament extending back to the sciatic notch of the bone. The mass is a good size and fixed. A scraping showed malignant cells. A dose of 6,500 mgh. of radium was administered. Dec. 14th, 1916: Rise of temperature. Examination showed that the opening to the cavity was blocked. A drainage-tube was introduced. Jan. 15th, 1917: A slough came away. Temperature still rises but less, pain also less and only felt at night. Patient remains in a prostrate condition, due to the disease and to the destruction produced by the radium. Feb. 2nd, 1917: Patient remains *in statu quo*.

CASE 9.—Chondro fibro-sarcoma in a boy, aged 6, recommended by Dr. J. S. Fraser. Admitted May 9th, 1916. The disease affected the left maxillary antrum, causing protrusion of the cheek, diplopia, and proptosis. Dr. Fraser removed as much as was possible of the growth by scraping, but fearing that he had not eradicated it consulted with Mr. Dowden with a view to the removal of the left superior maxilla. Mr. Dowden, however, was of opinion that the case was more suitable for radium. Tubes of radium were introduced through an opening into the mouth and a dose of 1440 mgh. administered. The patient was examined on Jan. 3rd, 1917, by Dr. Garretson, in the absence of Dr. Fraser, and he was unable to detect any sign of the disease. The boy appears to be perfectly well and is attending school.

CASE 10.—Myeloma of the sternum (old case) in a male aged 23, recommended by Professor Gulland. Admitted March 9th, 1915. Duration two years. Growth the size of a large cocoanut adherent to sternum. Symptoms: weakness and dyspnœa. Consultation with Mr. Miles, who considered the case inoperable. Four radium tubes were introduced by Mr. Miles into the growth and radium was also applied externally. A dose of 13,200 mgh. was administered. Within a month of this treatment the growth had entirely disappeared. Professor Gulland remarked, in regard to this case, "that he had watched the tumour growing during the past 18 months, that it was of very large size, quite as big as two fists, that he had been rather a sceptic as regards the value of radium in malignant disease, but that he was now quite converted. The growth was a myeloid sarcoma." The patient recovered his health and strength and went back to work. Six months' later a small recurrence appeared over the sternum. After a dose of 250 mgh. it disappeared, but was followed by an ulcer about 1 inch deep extending into the eroded sternum. No pain was associated with the ulcer, which slowly filled up. The patient had a course of iodide of potassium on Mr. Miles's advice. The patient was able to continue with his work. On Jan. 13th, 1916, Professor Gulland wrote: "This patient had a long course of inunction and of iodide of potassium before the radium treatment, but without the slightest effect. The ulcer has impressed me more as a continued destruction of the tumour, which must have started from the centre of the sternum." The foregoing appeared in last year's annual report. The further history is as follows. In February, 1916, a swelling occurred in the left axilla, which was removed by Mr. Miles in March 1916. The pathologist's report was the following: "A difficult growth to classify. There is a large amount of well-developed fibrous tissue. The cells have a tendency to arrange themselves in rounded follicles. They are polygonal in shape and suggest endothelial cells in appearance and arrangement. The condition I regard as a tumour formation belonging to the group of the lymphosarcomata but somewhat anomalous in character." Oct. 26th, 1916: The ulcer on the sternum is quite healed and the patient perfectly well.

MANCHESTER AND DISTRICT RADIUM INSTITUTE.

A report of the work of the Manchester and District Radium Institute (the Royal Infirmary, Manchester), by Dr. Arthur Burrows, the radiologist to the institute, deals with the period from Jan. 1st to Dec. 31st, 1916, which saw the completion of the first thousand cases presenting themselves with a view to radium treatment during the two years since the institute was started. Included in the report, in addition to a general table of all the cases which have been treated, is a list of all the malignant cases, excepting rodent ulcers, which were well at the end of 1916. This list states the time during which the patients have remained free from symptoms or signs of disease. No case of carcinoma of the breast was reported as being apparently well at the end of 1915, and therefore, in this particular instance, 12 months is the maximum period during which any patient previously

suffering from the disease can have been free from symptoms. During the year the energies of the institute have been limited to the purely clinical side of its work; but it is hoped that as soon as circumstances permit an increase in the scope of its activities will be possible. The physicist, Mr. Lupton, reports that 777 ordinary emanation tubes, 238 emanation tubes for needles, and 316 flat emanation applicators were made during the past year in the physical laboratory, showing an increase of 251 over the year 1915.

A series of cases illustrating interesting points in relationship to radium treatment is given, and two groups of these may stimulate the reader's interest to read the report itself.

Carcinoma of the breast.—In this instance the best results follow the implantation of an adequate number of emanation tubes in the growth and along the course of the lymphatic vessels. In some cases as many as 12 tubes have been buried at one time. If the tumour be very firmly fixed to the chest wall the results are not so good, and treatment by implantation must be employed with extreme caution or the breaking down of the growth may produce an intractable ulcer. Often it is better not to bury at all under these circumstances, but simply to apply plates externally. It is always necessary to convince oneself that the situation and size of the growth give adequate opportunities for local repair. If the growth of the breast be too large, it is best to remove it locally and to apply radium at the site of removal and along the lymphatic tract. Radium is also most useful in assisting surgeons to operate in border-line cases or for the treatment of inoperable glands of the neck. Small scattered glands of the neck may be treated by the application of plates or larger masses by the method of burying. In the latter instance the results are often most gratifying. Small secondary skin nodules often disappear when treated by superficial plates, but their widespread nature inclines one to think that it is likely that X ray treatment would be the best method of dealing with them in the future. It is by no means always necessary to produce a severe local reaction in order to remove a malignant growth by radium. It is often done without the patient's knowledge that anything is happening at all, and increase of knowledge will, no doubt, practically eliminate the occurrence of a reaction which is a source of discomfort to the patient.

CASE 1.—Female, aged 72. This patient had a two years' history of a swelling of the right breast with the formation of a lump in the right axilla. She had only slight symptoms of discomfort. Her surgeon deemed her growth to be inoperable. In the upper and outer quadrant of the right breast was a hard mass the size of a hen's egg. It was adherent to the skin, but could be moved somewhat on the chest wall. In the right axilla was a mass of six or more hard glands adherent to one another. Slight movement of them in the deep tissues was possible. Five radium emanation tubes (each of 20 mc. strength and contained in screens of platinum 3/10 mm. thick) were buried in the breast (three) and axilla (two) for 24 hours. The growth diminished much, and treatment was repeated two months later with four tubes. Three months later some indefinite thickening remained in the right breast, one gland could be felt in the right axilla, and one small supraclavicular gland had appeared. Treatment was continued by the external application of radium plates, screened by 1·5 mm. of lead, for 24 hours. This was repeated six weeks later, and seven months after the first application of radium all signs of the growth had disappeared.

The above is an example which shows how much perseverance is sometimes necessary. Other cases have cleared up more quickly, and it has not been necessary to apply plates.

CASE 2.—Female, aged 50. In 1913 radical amputation of this patient's right breast was performed for carcinoma. Twelve months later a nodule appeared at the inner end of the scar. The nodule gradually grew, and eventually broke down and ulcerated. When she presented herself with a view to radium treatment, she had at the sternal end of the breast scar an elliptical ulcer 3 × 2 cm. It was surrounded by a zone of infiltration measuring 1 cm. across, and its edges were thickened, hard, and undermined. The whole ulcer was intimately united with, and fixed to, the chest wall. In the neck above the inner end of the clavicle was a hard rounded gland the size of a hazel nut. It was not firmly fixed. No enlarged glands could be felt elsewhere. Looking to the nature and situation of the ulcer it was decided that treatment by external plates was the only method available. The patient received nine applications of plates of a strength of 2·5 mg. of radium to the square centimetre, screened by 5 mm. of platinum, for 25 hours, both to gland and ulcer, an interval of six weeks elapsing between each application. At the end of that period both the gland and the ulcer had disappeared, leaving no sign of the growth.

The above example shows that occasionally a good result may be obtained in an apparently unpromising case by the use of plates alone.

Tumours of abdominal muscle.—The three cases hereunder noted are all interesting from the point of view of diagnosis and radium treatment. The first case is one of true sarcoma of the left rectus, the other two are examples of fibrosis of the abdominal muscles and chronic interstitial myositis respectively. The case of sarcoma yielded very slowly to radium treatment, while the other two cleared up extremely rapidly.

CASE 1.—Female, aged 29. In September, 1915, this patient came to the Manchester Royal Infirmary for treatment of a hard growth about 15 cm. long and 7 cm. wide in the upper part of the left rectus abdominis. The surgeon made an exploratory incision, and a piece of the growth was removed for microscopic examination; it proved to be a myxo-fibro-sarcoma. On one occasion three tubes of radium emanation, each of a strength of 20 mc. and screened by 1 mm. of silver, were inserted into the growth for 24 hours. A considerable reduction in the size of the tumour resulted. It was then decided to continue the treatment entirely by means of heavily screened radium plates applied externally for periods of 25 hours. The patient has had nine such treatments, and the growth has slowly decreased in size until at present all that can be palpated is a small elongated patch of thickening. The treatment has thus been continued over a period of 14 months.

CASE 2.—Male, aged 42. This patient was operated on by a surgeon with a view to removing the tumour of the abdominal wall occupying practically the whole of the abdominal muscle to the right of the middle line, and from the level of the umbilicus downwards. At the time a piece of the growth only was removed for section, but no further operation was performed. The section under the microscope showed extensive fibrosis of muscle, which suggested syphilis, but the Wassermann reaction was negative. Two emanation plates, each containing 28 mc. of radium emanation and screened by 1·5 mm. of lead, were applied to the growth for 24 hours. Two months later no thickening whatever remained, and no recurrence of the growth has taken place, although 21 months have elapsed since the treatment was applied.

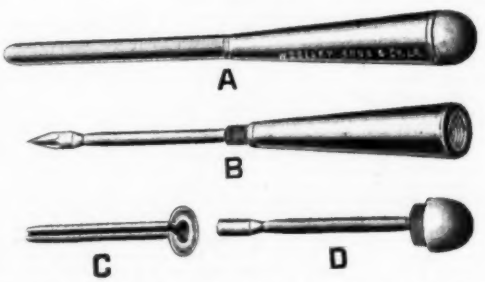
CASE 3.—Male, aged 40. This patient came to the Royal Infirmary in January, 1915. He had then five weeks' history of swelling of the left thigh and pain down the front of the thigh and leg. A large hard, fixed growth could be felt in front of the upper part of the left femur. It was hard, elliptical in shape, and about 15 cm. long. An exploratory incision was made over the tumour, and three emanation tubes containing 80 mc. of emanation were buried in it. A piece was removed for microscopic examination. The section showed the case to be one of chronic interstitial myositis. The growth rapidly became smaller, and the patient has now been free of signs and symptoms for nearly two years.

The classified results at the end of the year were as follows:—

Free of disease at the end of the year	105	Too early to note result	34
Improved	317	Prophylaxis	20
Not improved	216	Not treated	127
Abandoned treatment	91	Total	1000
Died from their disease	90		

A TROCAR FOR THE INTRODUCTION OF RADIUM TUBES.

The accompanying illustration shows an instrument which Dr. Arthur Burrows has devised for introducing radium and radium emanation tubes into tumours when there is no danger of perforating important structures. It consists of a sharp trocar (B), a cannula with a slot running its whole length (C), and a blunt trocar (D). The sharp trocar and the cannula are thrust into the growth to the required depth, and the trocar is withdrawn in the usual manner. The radium tube is then inserted in the cannula, and its silk attachment for withdrawal is slipped



into the slot. Next the blunt trocar pushes the tube home. The cannula is then pulled up along the trocar, and its lower end and the silk are thus completely disengaged, and the trocar and cannula are withdrawn leaving the tube in position. The process is quick and practically no scar remains. The component parts of the introducer screw together into a compact whole as in A. The internal diameter of the cannula is 3 mm. The instrument has been made for Dr. Burrows by Messrs. James Woolley, Sons, and Company, Limited, of Manchester.

Colonel George Henry Barefoot, C.B., C.M.G., A.M.S., has been appointed a Knight of Grace of the Order of St. John of Jerusalem.

MEDICINE AND THE LAW.

The Supervision of Poisons.

THE sentence to various terms of penal servitude of three out of the four persons who were recently charged at the Old Bailey with conspiring to murder two Cabinet Ministers brought to a fitting conclusion a story of rancorous plotting against persons in authority, of perverted ingenuity, and of fatuous recklessness, such as we are accustomed to associate with the cruder novel of crime or with cinematograph exhibitions. The sheer improbability of many of the events might have led to acquittal if the prosecution had relied only on the reported conversations of the accused, but the discovery in the possession of one of them of substantial amounts of deadly poisons, and the most ample evidence that these poisons had been provided by another of them, placed their individual and combined guilt outside the range of doubt. We do not propose to comment upon the details of the schemes developed by the Wheeldons in their conversations with the detectives whose astuteness, combined, it would seem, with good fortune, brought them upon the spot at precisely the right moment for effective action. To do so with any point would be to suggest where the proposals for murder made by the plotters might have failed or been improved. But to one thing we call attention, and not for the first time. The poison in the possession of these persons of dangerous character was deadly if they were skilful enough to use it. The fact that in this instance it might have been employed to strike a shrewd blow at the country's safety should strengthen the hands of magistrates in all cases in which irregularity in the sale of poisons is proved. The regulations governing such sales, however strictly enforced, cannot be expected to prevent altogether the obtaining of poisons by the criminal, but they can, no doubt, do much to limit the amount thus accessible and to render its acquirement difficult. The precautions taken to prevent the surreptitious abstraction of drugs and dangerous substances from hospitals and institutions, where they are legitimately stored and handled daily, cannot be expected to prevent all pilfering by persons unfit for the trust reposed in them, but the example of Mason should call attention to the necessity for the rigorous employment of such precautions, and more particularly so at a time when assistants are being employed as to whose antecedents and characters there may be no trustworthy information. The element of doubt which is sometimes found in trials where poisons form the subject of expert evidence seemed entirely absent in this case. The prosecution had it all their own way, and the notice of appeal which was lodged has been dismissed.

The Sale of Arsenic.

By an Act of Parliament passed in 1851 (14 & 15 Vict., c. 13), among the restrictions laid down to regulate the sale of arsenic, it is ordered that no one shall sell it "to any person who is unknown to the person selling," unless the sale is made in the presence of a third party who is known to both vendor and purchaser. In a recent prosecution brought under this Act by the police at Slough against a druggist, it appeared that no legal decision has been given as to the interpretation of the expression "unknown." The druggist, who was stated to have conducted his business blamelessly for 17 years, in this case sold a small quantity of arsenic to an Australian soldier whom he had seen going about in the district for about a fortnight and who had previously made a purchase at his shop. The soldier had stated that he wanted the arsenic in order to cure a fox-skin. The druggist observed that it should be mixed with soap for that purpose, and on account of the use to which it was to be put sold the small quantity required, without mixing it with soot or indigo, as ordered by the Act referred to. Otherwise the sale was concluded with regularity. The soldier was afterwards apprehended as an absentee from his regiment and the arsenic was found upon him. When the question came to be argued, whether in the circumstances the purchaser of the poison was known or unknown to the vendor, it was stated that a stipendiary magistrate at Manchester had held in 1887, in a similar case, that the onus of proof lay upon the defendant; while, on the other hand, at Salford in 1889, the bench had decided that it was for the prosecution to prove that the purchaser was unknown to the druggist. The Slough magistrates appear to have taken the view that the sale in the circumstances described constituted a sale to a person unknown to the druggist, for they inflicted a fine of £1 upon that charge and £2 upon a further charge of selling arsenic in less quantity than 10 pounds.

A Case for Diagnosis.

In a case recently tried at the Brighton county court the question arose whether the plaintiff suffered in the autumn of last year from ptomaine poisoning as the result of eating a pork-pie, or whether his illness was an attack of gastro-intestinal influenza following a visit to a picture house. The plaintiff, who had been staying at a home of rest in the neighbourhood, visited a picture house in Brighton, and on returning to the station purchased at defendant's shop a pork-pie which he "washed down with a dry ginger." A friend also bought a pie, but according to the evidence only ate the crust, throwing the meat away. The friend was not taken ill, but the plaintiff's indisposition necessitated a prolonged stay at the home of rest. Two doctors were called to give evidence on each side. Judge Mackarness, commenting on the medical evidence, said that one thing the four doctors were all agreed upon was that in the absence of an analysis of the excreta it was not possible to speak with absolute certainty as to ptomaine poisoning. Unfortunately no such analysis was made. It seemed, he said, quite possible from the medical evidence that the plaintiff might have developed influenza during his visit to Brighton, but in his opinion the medical evidence pointed to ptomaine poisoning as a very probable cause of the plaintiff's illness. He commented on the fact that there were no other sufferers among the many purchasers from the same shop on the same day, and said that it would not be right that plaintiff's misfortune should be visited on the head of defendant unless the evidence clearly established that the pork-pie was unfit for human food and was the cause of his illness. The evidence fell short of that and he gave judgment for the defendant.

THE CONTROL OF VENEREAL DISEASES.

Approved Council Schemes.

REPLYING to a question in the House of Commons on March 12th, Mr. Hayes Fisher, Parliamentary Secretary to the Local Government Board, stated that 20 local authorities in England had provided facilities for the free treatment of venereal diseases in 28 hospitals. The number of councils whose schemes have been approved by the Board is now 60, the list being as follows :—

County Councils.—Buckinghamshire, Cambridgeshire, Derbyshire, Durham, Isle of Ely, Essex, Gloucestershire, Herefordshire, Hertfordshire, Kent, Leicestershire, County of London, Middlesex, Norfolk, Northamptonshire, Northumberland, Nottinghamshire, Pembrokeshire, Peterborough (Soke of), Radnorshire, Rutland, Salop, Suffolk East, Surrey, Sussex East, Sussex West, Warwickshire, Westmorland, Wiltshire, Worcestershire, Yorkshire (East Riding).

Town Councils.—Bath, Birmingham, Blackpool, Bootle, Bradford, Brighton, Cardiff, Croydon, Dewsbury, East Ham, Hastings, Ipswich, Kingston-on-Hull, Leeds, Leicester, London (City of), Merthyr Tydfil, Middlesbrough, Newcastle-upon-Tyne, Northampton, Nottingham, Portsmouth, Salford, South Shields, Tynemouth, Wallasey, Warrington, West Ham, York.

In the case of Rutland County Council and Blackpool town council full schemes have been submitted, but they are at present approved for laboratory facilities only. Merthyr Tydfil, Middlesbrough, and York town councils have only submitted partial schemes for laboratory facilities and supply of salvarsan substitutes, and these have been approved. There remain at present 85 local authorities who have not yet presented schemes, or whose schemes have not yet been approved by the Local Government Board.

The Participation of Hospitals.

A White Paper issued by H.M. Stationery Office [CD 8509, price 1*d.*] states that between 130 and 140 hospitals in England and Wales have expressed their willingness to participate in the schemes of local authorities, and although in a few instances the authorities of important hospitals have been reluctant to inaugurate during the war any fresh arrangements for the treatment of venereal diseases, this hesitation has already been overcome in some cases. The shortage of medical staff and the pressure on the accommodation at most hospitals at the present time have presented obstacles in many instances, but the former difficulty has been met to some extent by the Army Council arranging that

certain officers of the R.A.M.C., who are specially skilled in the treatment of venereal diseases, should devote part of their time to the work of the clinics provided at general hospitals for the treatment of these diseases.

Treatment at Lambeth Infirmary.

Mr. A. L. Baly, in a report upon the treatment of venereal disease at Lambeth Infirmary, mentions that all the assistant medical officers are trained to administer galyl intravenously and grey oil intramuscularly, and during the nine months ended Dec. 31st last 395 injections of the former have been given without a single untoward effect. In some cases it has been found desirable to give more than three injections of galyl, and the number of patients presenting themselves for mercurial treatment has risen very considerably. When desirable, patients are advised to remain in the infirmary until all infective lesions have disappeared; on the other hand, an increasing number of patients are admitted for week-ends to receive their injections. Very few men suffering from acute gonorrhœa apply for admission. When admitted they receive the most modern treatment, but the ward in which they are at present accommodated is of a temporary character. In regard to gonorrhœa in the female, many of the cases admitted being already in a confirmed and chronic stage, only prolonged and vigorous in-patient treatment appears to give satisfactory results. The pathological work of the infirmary has grown to such an extent as to occupy the whole time of one of the assistants, who is an expert pathologist. Mr. Baly suggests that examination for specific organisms should be made in the infirmary laboratory, as well as the Wassermann reactions for examinations made for diagnostic purposes in connexion with tabes, cerebral syphilis, aneurysm, and other late manifestations, and a grant claimed in respect of infective cases. For the purpose of claiming Government grants, he says:—

It may be necessary to compile records showing the number of days during which patients are maintained in the infirmary suffering from venereal disease during the infective stage, apart from their maintenance for any other cause or for a continuation of their treatment after the infective stage has passed. I propose this should be done by keeping a special index card which will show (1) date of admission; (2) the date on which, in the medical officer's opinion, the patient ceased to be infective; (3) the number of days so maintained. I suggest that the latter date (2) should be determined by the cessation of any infective discharge and the healing of all infective lesions, and in the case of gonorrhœa, when the gonococcus can no longer be found by microscopic examination. I propose that the guardians should claim a grant under the following conditions: (i.) Primary syphilis; (ii.) all recognised secondary syphilitic conditions; (iii.) rupia; (iv.) congenital syphilis when associated with infective lesions; (v.) all forms of gonorrhœa, excluding ophthalmia neonatorum, in which an infective discharge is present as demonstrated by the presence of the gonococcus.

The Coöperation of the General Practitioner.

In connexion with the public provision for diagnosis and treatment of venereal diseases, the Local Medical Committee for the County of London calls attention to the new clause which has this year been added to the panel practitioner's agreement:—

Where the condition of the patient is such as to require services beyond the competence of an ordinary practitioner, the practitioner shall advise the patient as to the steps which should be taken in order to obtain such treatment as his condition requires and shall, where provision is made for such services in or for the area, by any public authority, after consultation with the Local Medical Committee, and due notice of such provision has been given to the practitioner by the Insurance Committee, take such other steps as may be reasonably necessary, in order that the patient may derive full advantage from the provision of such services: Provided that where, for the purpose of defining the duties of practitioners as aforesaid, a scheme has been prepared by the Panel Committee in consultation with the Insurance Committee and approved by the Commissioners, the provision of any such scheme shall be deemed to be part of the agreement and shall be substituted for this clause.

As the public provision now made is available for every member of the community, and general practitioners can assist their patients to derive full advantage from the provision by drawing their attention to the times of attendance at the various hospitals, the Local Medical Committee does not consider it necessary, at any rate for the present, for the Panel Committee to put forward any such scheme. On the other hand, the Local Medical Committee emphasises the need for individual judgment:—

At the outset every practitioner should recognise his individual responsibility to exercise his own personal judgment with regard to the nature of any form of treatment to which he advises or encourages his patient to submit. A practitioner cannot send a patient to special clinics with a definite expectation that any particular form of treatment, such, for example, as injections of salvarsan, shall be adopted. It must rest with the member of the staff responsible for the case to use his own judgment as to the general value of salvarsan or any similar drug and as to its applicability in the particular case. In the same way, the authorities of the hospital, in referring a case to a general practitioner, cannot dictate the form of treatment to be applied. The general practitioner must exercise his own discretion as to the form of treatment which in his hands he believes will be most beneficial to his patient.

The Local Medical Committee emphasises the fact that salvarsan is on its trial, and that those who are making the freest use of it differ amongst themselves as to the indications for its use, its mode of administration, its dosage, and its dangers, and adds that it would be greatly to the public interest if the Medical Research Committee were able to make investigations into some of the difficult questions connected with the limitations of the use of salvarsan and the trustworthiness of the Wassermann reaction and to issue a report thereon. The Local Medical Committee considers that it is the duty of every practitioner to take such opportunities as may be available of learning at first hand from those with large experience the details of the modern treatment of syphilis, and that no blame can possibly be attached to a practitioner who, having given careful consideration to the requirements of a patient under his care, decides not to adopt or recommend any particular form of treatment.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

To be Temporary Surgeon: William F. W. Betenson.

The following appointments have been notified:—

Fleet-Surgeons: J. D. Hughes to Devonport Dockyard; W. R. Trythall to *Téméraire*; and A. R. Schofield to *President*, additional.

Staff-Surgeon: G. T. Verry to Southampton

Temporary Surgeons: B. W. Dakers to *Pembroke*, additional; H. S. Brown to R.M. Depôt, Deal; E. H. Hugo to Gibraltar; and W. F. W. Betenson to *Victory*, additional, for Haslar Hospital.

ARMY MEDICAL SERVICES.

TERRITORIAL FORCE.

Major H. A. Howes to be Deputy Assistant Director of Medica Services.

ROYAL ARMY MEDICAL CORPS.

Majors relinquishing the acting rank of Lieutenant-Colonel on re-posting: J. Fairbairn, R. P. Lewis.

Major J. W. West to be acting Lieutenant-Colonel whilst commanding a General Hospital.

To be acting Lieutenant-Colonels whilst commanding a Field Ambulance: Major J. Powell Capts. (acting Majors) P. G. M. Elvery, G. F. Rudkin, C. L. Franklin, A. D. O'Carroll, G. H. Stevenson, P. S. Tomlinson, B. Johnson, E. M. Middleton, and Temp. Capt. (acting Major) C. V. Bulstrode.

TERRITORIAL FORCE.

Major H. A. Howes is seconded whilst holding an appointment as Deputy Assistant Director of Medical Services.

Lieuts. J. Fraser and H. W. Beedham to be Captains. G. Bryce to be Lieutenant.

TERRITORIAL FORCE RESERVE.

Lieut.-Col. J. T. R. Wilson, D.S.O., from Royal Scots, to be Lieutenant-Colonel.

Capt. A. Findlater, D.S.O., from London Mounted Brigade Field Ambulance, to be Captain.

VOLUNTEER FORCE.

H. J. Wood, 5th Battalion Kent Volunteer Regiment, to be temporary Lieutenant and Medical Officer.

E. Ellis, 8th Battalion Yorkshire West Riding Volunteer Regiment (late Second Lieutenant 1st V.B. West Riding Regiment), to be temporary Lieutenant and Medical Officer.

G. Hollies, 1st Battalion Shropshire Volunteer Regiment (late Lieutenant-Colonel, R.A.M.C.), to be temporary Captain and Medical Officer.

T. W. Dewar, 2nd Battalion Perthshire Volunteer Regiment, to be temporary Lieutenant and Medical Officer.

SERVICE NEWSPAPERS' AMALGAMATION.

The *Army and Navy Gazette* and the *Broad Arrow* will, on April 21st, be incorporated under the one title, *The Army and Navy Gazette, the Broad Arrow, and the Naval and Military Gazette.*

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS.

The March issue of this journal opens with an analysis by Colonel Sir William B. Leishman and Major A. B. Smallman of Recent Cases of Tetanus in the British Expeditionary Force, with special reference to their treatment by antitoxins. Some of the tables illustrating the article are remodelled upon those adopted by Sir David Bruce in an article published in THE LANCET of Dec. 2nd, 1916, p. 929, and "they may be read as complementary, one to the other, and may in this way serve to bring into greater relief the points in which the experience of home hospitals are in contrast or in accord with those acquired in the Expeditionary Force." In the reprint of a paper on Neurasthenia and Psychasthenia, read before a Conference of Medical Officers at Malta in November last, Colonel Howard H. Tooth essays to define the limits of neurasthenia and the true stigmata of the disease in order that the real neurasthenic may be justly appreciated on the one hand, and that the Army may not be unduly depleted on the other. The Nitrogenous Food Requirements of Some of the Commoner Pathogenic Bacteria is the subject of an article by Lieutenant-Colonel M. H. Gordon, and the joint inquiry by Lieutenant-Colonel C. M. Wenyon and Captain F. W. O'Conner into problems affecting the spread and incidence of protozoal infections of British troops and natives in Egypt, with special reference to the carrier question, is continued.

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue :—

Killed.

Lieut. D. R. Kharas, I.M.S.
Capt. M. R. Hughes, Australian A.M.C.

Drowned.

Capt. G. L. Atkinson, R.A.M.C., was a student of King's College, London, and qualified in 1896. He held appointments at King's College Hospital and at the Victoria Hospital for Children, Chelsea, and was in practice at Hampton Hill, Middlesex, prior to joining the R.A.M.C.

Died.

Lieut.-Col M. J. Whitty, R.A.M.C., qualified at the Royal University of Ireland in 1885, and shortly afterwards joined the Army Medical Service, from which he retired in 1906. He was later re-employed as medical officer to the Liverpool recruiting area, and died at Liverpool on March 28th.

Wounded.

Lieut.-Col. W. Egan, R.A.M.C.
Capt. M. A. Nicholson, R.A.M.C.
Capt. A. B. Chapman, Canadian A.M.C.
Capt. A. C. Falkiner, R.A.M.C.

DEATHS AMONG THE SONS OF MEDICAL MEN.

The following sons of medical men must be added to our lists of those who have fallen during the war :—

Second Lieut. H. F. Johnson, East Kent Regiment (The Buffs), only surviving child of Dr. G. L. Johnson, of Hampstead, London, and Johannesburg, South Africa.
Lieut. J. S. R. Hodgson, Dorset Regiment, elder and only surviving son of Dr. H. Hodgson, of Alresford, Hants.
Second Lieut. V. F. H. Hugill, Royal Fusiliers, attached Royal Flying Corps, only son of Dr. G. F. Hugill, of Balham, Surrey.

MENTIONED IN DESPATCHES.

The name of the following medical officer should be added to the list of names published in THE LANCET of Feb. 3rd, 1917, *p.* 201 :—

Temp. Capt. E. P. Satchell, R.A.M.C.

THE REVIEW OF MEDICAL EXCEPTIONS.

The Military Service (Review of Exceptions) Bill, which passed the House of Commons on Tuesday last, will give the Army Council the right of requiring disabled and previously rejected men to present themselves for examination. This will throw a prodigious amount of fresh work on medical boards, who will require every possible assistance in the carrying out of a difficult task. The use by the boards of certificates from civil practitioners has been discussed, and it has been felt in some cases that personal bias has been shown leading to the exception of a man who was really fit to serve. It must be remembered, however, that in many instances it is difficult for a medical board to come to a fair conclusion without a reliable clinical history of the man in question, which can only be given by his regular medical attendant. In doubtful cases it would probably be wise to give medical boards power to detain an examinee under observation in a special or military hospital for a short period. Such a course might be found especially useful in conditions such as doubtful cases of pulmonary tuberculosis; slight cardiac weakness when no murmurs are present; difficulty in distinguishing between functional and organic affections; and when malingering (including doping) is suspected. The advantages gained would be similar to those of the observation beds in an infectious hospital or the casualty department of a general hospital—viz., the avoidance of overlooking serious disease not recognisable as such at first sight, and, on the other hand, of attaching undue weight to transient and unimportant symptoms. This course would thus in some instances prove of great advantage to the man and in others to the Army.

OBITUARY OF THE WAR.

MALDWYN LESLIE WILLIAMS, M.B., B.S. MELB.,

LIEUTENANT-COLONEL, AUSTRALIAN ARMY MEDICAL CORPS.

Lieutenant-Colonel M. L. Williams, who died of wounds in France on March 3rd at the age of 31, was one of the best known among the younger men of the medical profession in Victoria. After matriculation he entered Trinity College, Melbourne, and had a distinguished career as a student, graduating with honours M.B., B.S., of Melbourne University in 1908, and obtaining an appointment on the resident staff of the Melbourne Hospital in the following year. He was subsequently medical superintendent to the Bendigo Hospital, relinquishing this appointment to commence private practice in Bendigo. On the outbreak of war he volunteered for active service and was appointed major to an Australian field ambulance which served in Egypt and France. He was later promoted lieutenant-colonel and placed in command of another field ambulance, with which he was on duty when he received the wounds from which he died.

Colonel Williams made many friends during his University career. He gained his football blue and represented Melbourne in Inter-University matches. His loss will be keenly felt by a large circle who regarded him as a man of much promise in the medical profession. He leaves a widow and two children.

SAMUEL W. HEWETSON, M.D. QUEBEC,

LIEUTENANT-COLONEL, CANADIAN ARMY MEDICAL CORPS.

Lieutenant-Colonel S. W. Hewetson, who died at the Royal Free Hospital, London, from perforative colitis, was officer in command of the 8th Canadian Field Ambulance. He was born in November, 1872, at Kincardine, Ontario, entered the medical school of McGill University, where he was a brilliant and popular student, and graduated in 1893. Unfortunately, soon after graduation tuberculosis showed itself, and he became a patient under the late Dr. Trudeau at Saranac, remaining, as did so many of Dr. Trudeau's medical patients, to be one of his enthusiastic assistants at the sanatorium. Readers of his autobiography published last year will recall Trudeau's warm words of appreciation of Dr. Hewetson and his services. His malady led him eventually to settle in the highlands of Alberta, at Pincher Creek, whence, after a few years, when his health was thoroughly re-established, he moved to Calgary, becoming there a popular practitioner. For many years he had been an active member of the Canadian Militia, his majority in the Army Medical Corps dating from 1910. With the beginning of the war he was appointed A.D.M.S. of the Alberta district. Attached first to the 13th Canadian Mounted Rifles in January, 1916, he organised the 8th Canadian Field Ambulance, of which he was placed in command, proceeding overseas to France in the spring of the same year. Lieutenant-Colonel Hewetson was married, his wife having predeceased him.

HERBERT JONES, M.D. ONTARIO,

MAJOR, CANADIAN ARMY MEDICAL CORPS.

Major H. Jones, the news of whose death overseas has been received, was born in September, 1871, taking up his medical studies at a comparatively late period and graduating from Toronto University in 1904. He then settled in practice in Hamilton, Ontario. After the outbreak of war he joined the 5th Canadian Field Ambulance as captain and showed himself an excellent officer, gaining his majority in November, 1915, after several months of work at the front. His death was due to pneumonia, which proved fatal after a brief illness.

HUGH BARR, M.D. GLASG., D.P.H.,

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain H. Barr, who fell in action in Greece on Feb. 21st at the age of 35 years, was born in Paisley, receiving his early education at the Grammar School there. It was characteristic of him that, even as a student, he had decided definitely on what was to be his life's work in medicine; and it was with the view of acquiring a sound knowledge of

medicine preparatory to embarking on the study of public health that several of the years immediately following graduation were devoted by him to hospital practice in England. Having obtained the diploma of Public Health, he visited Germany, where he studied bacteriology under Professor Dunbar at Hamburg, soon becoming fluent in the language. Going to New Zealand about 1910, largely on account of his health, he quickly built up there a large practice, which he relinquished to accept a commission in the Royal Army Medical Corps. At the end of a year's service in hospital at Salonika he returned to Scotland for a short time, being then sent to Greece. His term of six months, during the latter part of which he was attached to an ambulance train, he had almost completed when he met his end.

A friend who knew Captain Barr intimately speaks of him as one whose cheerfulness and ready wit could not but enliven the dullest company. His mind was always active, and in its interests not confined to medicine alone. His knowledge of sociology and philosophy was considerable, and extensive travelling served further to broaden his outlook. His many friends can ill spare his companionship.

JOHN MAXIMILIAN HAMMOND, M.B., B.S. LOND.,

LIEUTENANT, ROYAL ARMY MEDICAL CORPS.

Lieutenant J. M. Hammond, who died on Feb. 12th of wounds contracted on active service at the age of 41, was son of the late Henry A. Hammond, of Bournemouth. He studied medicine at Bristol University College and St. Bartholomew's Hospital, London, qualifying in 1908 and holding resident appointments at the West London Hospital. In 1911 he started in practice at Bournemouth, becoming medical registrar to the Hahnemann Home, relinquishing this work in the autumn of 1914, when he volunteered to go out to the English section of the French Military Hospital at St. Malo. Last July he was given a commission in the R.A.M.C., sailing for Salonika in August attached to the Devonshire Regiment. He was wounded by a shell during an attack on the Bulgar lines, and did not long survive an operation.

A colleague writes of Lieutenant Hammond as a man who stood over 6 feet high, and of whom largeness was the prevailing characteristic. "Large-hearted, he was always ready to do a kindness to others. Nothing was a trouble, no detail too small to receive attention. At St. Malo, besides treating the wounds of the *poilu*, he ministered to their souls, and with his perfect knowledge of French many was the death-bed soothed by *le grand Anglais*." Fellow officers from the Macedonian front bear testimony to his good influence on the morale of the men. In the end it would seem that he gave his life for them. "I found I had lost my tourniquet," he says, in a letter received since his death, but the missing tourniquet was doubtless doing service to some wounded man whom he had recently tended.

SYDNEY DOMVILLE ROWLAND, M.A. CAMB., M.R.C.S. ENG.,

MAJOR, ROYAL ARMY MEDICAL CORPS.

Major S. D. Rowland, who died of cerebro-spinal fever on March 6th, was the son of the Rev. W. J. Rowland and was born in 1872. He was educated at Berkhampsted School and Downing College, Cambridge, where he held a natural science scholarship, finishing his medical studies at St. Bartholomew's Hospital in 1897. Clinical medicine did not appeal to him, and at the end of the following year he joined the staff of the Lister Institute as assistant bacteriologist, remaining attached to that institution until his death. His first investigations dealt with the structure of bacteria and the enzymes in expressed cell juices; then with the late Dr. Allan Macfadyen he was engaged on a long research on the juices obtained by grinding up bacteria at the temperature of liquid air. In 1905 he went to India as a member of the commission for the investigation of plague, and took an important share in making out the relationship of plague bacilli to fleas and in establishing the part played by the rat flea in the dissemination of the disease. On his return to England he worked on problems of plague immunity, publishing a number of valuable papers concerned chiefly with the fundamentals of prophylactic inoculation. On the outbreak of war he joined the R.A.M.C. and went to France in October, 1914, in charge of the first mobile laboratory. Recently he worked at meningococcus carriers, and was thus engaged when he himself succumbed to an attack of cerebro-spinal fever.

Major Rowland's colleagues speak of him as an exceptionally skilled mechanic, whose ingenuity in getting over the technical difficulties of experimental work was of the greatest service to himself and his fellow-workers. His command of microscopical manipulations was also much beyond the ordinary level. "He was interested in almost everything, took the cheeriest zest in life, and was never afraid of his imagination. Impulsive, erratic, generous to a fault, he was deeply loved by his friends."

THOMAS WILLIAM JONES, M.D., D.P.H. LIVERP.,

LIEUTENANT, ROYAL ARMY MEDICAL CORPS.

Lieutenant T. W. Jones, who was killed in action on or about March 10th, at the age of 31 years, had a distinguished career as a student at Liverpool University, winning four of the five scholarships open to him—viz., the Gee Entrance Scholarship, the Junior and Senior Lyon Jones Scholarships, and the University Scholarship in Medicine. He was also Holt medallist and prizeman in midwifery. He graduated M.B., Ch.B., with first-class honours, in 1908, taking his M.D. in the following year, and subsequently the diploma of Public Health. For a year he held the Ethel Boyce Fellowship of the University. After holding various resident appointments and the demonstratorship in obstetrics at the University, he was appointed in December, 1912, medical officer of health for the rural district and

borough of Wrexham, and medical officer to the Wrexham education authority. At the outbreak of war he was amongst the first to volunteer for service in the Royal Army Medical Corps, and although his authorities were willing to release him, it was not until November, 1916, that the Local Government Board consented to his accepting a commission. He left for France in December and in February became attached to the Northumberland Fusiliers. He met his death whilst rendering assistance to a wounded man who was unable to take cover from shell-fire.

As a public official Lieutenant Jones enjoyed the confidence of his colleagues. The chairman of his health committee at Wrexham bears witness to his excellent work in progressive sanitation and laments the tragic termination of a career which would have benefited the public health service of the country. Others speak of his duties discharged with thoroughness and efficiency, as well as with a tact which commended him to all his associates. Lieutenant Jones leaves a widow and a little daughter.

CECIL FRANCIS UMNEY.

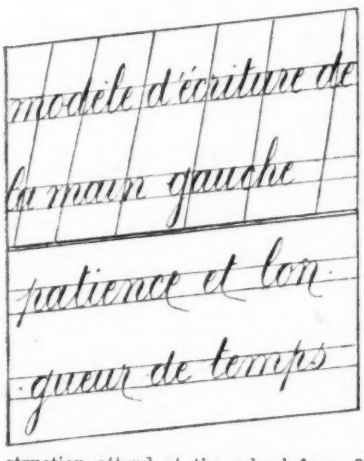
Second-Lieutenant C. F. Umney, Dorset Regiment, who was at first reported missing but is now known to have been killed in action on Sept. 26th last, was elder son of Dr. W. F. Umney, of Sydenham. After matriculating at London University he was apprenticed to Mr. W. H. Martindale, manufacturing chemist, who writes of him as a cheerful and hard worker, showing great promise in his work. "His disposition was one of the brightest, and all with whom he came in contact could not fail to like him."

EDUCATION OF THE LEFT HAND OF DISABLED SAILORS AND SOLDIERS.

Dr. C. W. Hutt writes to us in the hope that the following account may inspire further effort to assist the men in our naval and military hospitals and convalescent homes who have lost their right hand, in acquiring in as short time as possible such a use of their left hand that they may in but small measure feel handicapped by their loss.

At the Ecole Professionnelle de Blessés at Montpellier, since July, 1915, M. Tamenne, a Belgian refugee, has been teaching disabled men how to use their left hands. Having lost his right fore-arm when 16 years old he has so re-educated his left hand that he is almost unconscious of his loss. He needs no assistance to carry out the small operations of daily life; he can shave himself, button collars, tie his tie and bootlaces, cut up meat, peel fruit, roll cigarettes, and get on a bicycle quite as well as a man with two hands. In addition he has learnt and is able to teach writing, shorthand and typewriting with the left hand only. Convalescent men from the military hospitals at Montpellier needing this instruction attend at the school from 2 to 4 daily in the afternoons; some 132 have now passed through the course.

FIGS. 1 AND 2.

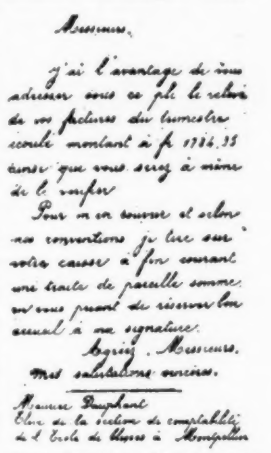


The exact mode of instruction of the left hand in the operations of daily life was recently set forth in THE LANCET,[1] in an abstract of the experiences of Count Zichy, a Hungarian, who, losing his right arm when 14 years of age from the accidental discharge of a sporting gun, taught himself the greatest possible use of his other hand.

M. Tamenne, through the agency of my friend, M. Edmond Dronsart, Directeur Technique de l'Ecole, has kindly sent me a detailed account of his method of teaching handwriting. He places considerable emphasis on the men learning to write in a hand resembling as closely as possible their former handwriting. This, he holds, contributes in a large degree to the men losing the habit of thinking themselves as disabled or handicapped in any way. To this end the writing taught has the same slope as ordinary writing, not even upright writing is allowed. The position of the body is the same as when writing with the right hand; the desired slope is obtained by the position of the fingers and of the paper. To write with the left hand, he says, the man should—

(1) Place his forearm comfortably on the table so as to fatigue the hand as little as possible.
(2) Practise writing between lines about 3·5 millimetres apart.
(3) Place the paper in the sloping position shown in Figs. 1 and 2.
(4) Try from the very beginning to give the usual slope to the letters. If this proves too difficult he should draw faint lines in an oblique direction as shown in Fig. 1, and endeavour to make the up- and down-strokes of the letters come parallel with these lines.
(5) Always take care that the hand is immediately below the point where he is writing.

The man will find the last two rules difficult to carry out and the efforts to do so will tire his hand; he should leave off for a few minutes and then resume his attempts. After about nine or ten lessons of an hour and a half this trouble disappears and the man is able to form the letters easily and well; the movements of the hand become more and more precise. During the next 12 or so lessons he should practise writing between lines about 2·5 millimetres apart, when the letters will be the size used in ordinary writing; later, paper with single lines should be used. A mistake some of the men make after five or six lessons is to try to rush their learning, with the result that they form the letters badly and lose the ground already gained. Speed in writing can only be acquired with practice and time. M. Tamenne finds that if a man practises for more than a limited time each day he loses interest and does not do so well in the end.



Copy of writing of a discharged soldier who has attended the course. His right arm is paralysed.

At first the movements of the hand are uncertain, but care should be taken that the letters are written as much as possible in their usual form, from the moment the man takes up his pen to the end of the last word. It often happens in the formation of the last letter in a word that owing to failure of attention the pen travels below the line. (See Fig. 2.) Patience is necessary from the start; the man must not want to get on too fast; a lesson of an hour and a half is enough for the first ten days. At the end of this time the man may practise for an hour to an hour and a half in the morning and for the same time later in the day, until the time comes when he no longer experiences any fatigue during writing. After two months' tuition the men are able to take their place in the commercial class ("section de comptables") and carry on as well as right-handed men. This work is in a way analogous to the attempt to make children ambidextrous. M. Dronsart has had experience of work on these lines among elementary school children, and has found that the results obtained are not proportionate to the efforts entailed. But one great factor present in disabled men is lacking in these children—necessity.

At Queen Mary's Hospital for Limbless Sailors and Soldiers at Roehampton men are being taught writing with the left hand. Anyone desiring to help our disabled men "se gaucher" could obtain there useful information, or better still, they should try to find a M. Tamenne.

THE NATIONAL RUMANIAN RELIEF FUND.—Sir William H. Dunn, Lord Mayor of London and honorary treasurer of this Fund, has issued an appeal for money to provide Rumania with Red Cross equipment and to relieve distress among the civilian poor. He points out that the medical services of Rumania are quite inadequate to deal with the rush of wounded now pouring in to the already crowded hospitals. The address of the Fund, which is under the patronage of Queen Alexandra and of Queen Marie of Rumania, is 30, Bishopsgate-street, E.C. 2.

[1] THE LANCET, 1916, ii., 241.

THE PARIS CONFERENCE ON THE WAR CRIPPLE.—We have received from M. L. de Paeuw, Secretary-General of the Franco-Belgian Organising Committee, a programme of the important inter-allied conference to be held in Paris on May 8th at the Ministry of Labour. The conference is being called to consider occupational re-education and all the questions which interest the war cripple. Of the five sections, the first is devoted to physical re-education; the second to occupational re-education; the third to the placing of the cripple in agriculture and industry; the fourth to his economic and social interests; and the fifth to the special needs of the blind and the deaf. Contributions to the discussion are solicited from all who have special knowledge, and correspondence is invited with the Secretary-General at 1, rue du Bocage de Bléville, Havre.

CANADIAN ACCOMMODATION FOR CONVALESCENT SOLDIERS.—A Canadian correspondent writes: "The Canadian Military Hospitals Commission announced on Feb. 19th that there is now available in Canada accommodation for 2955 convalescent soldiers. There are established a chain of 29 institutions stretching across Canada from Halifax to Vancouver. Accommodation is also in sight for an additional 2200 as follows: Whitby (Ontario) Hospital for the Insane, 750; Guelph (Ontario) Provincial Prison Institution, 500; Halifax (Nova Scotia) main building, Dalhousie University, 200; Winnipeg old Agricultural College, 600; Saskatoon (Sask.) Y.M.C.A., 150. The actual number of convalescent soldiers under the care of the Commission on Feb. 2nd, 1917, was 1930, besides 105 in other hospitals, and 1021 out-patients. There is also accommodation for 620 cases of tuberculosis in 13 sanatoria, and accommodation for 544 in preparation. The actual number of patients now in sanatoria is 394. A clearing hospital for 550 men has been provided at Halifax, and accommodation for 2225 more is being prepared at Montreal, Kingston, St. John, Halifax, Toronto, and Winnipeg. With a view to future needs accommodation has already been secured for 1589 in 19 hospitals from Quebec to Victoria, B.C. The total accommodation for bed cases will thus be 4364, to which 730 may be added by transferring four of the convalescent institutions to the 'active' class. The total accommodation available or in sight for all classes is 10,683, inclusive of the Quebec clearing depôt, where there is room for 600."

GLASGOW AND MEDICAL MOBILISATION.—At a meeting of the registered medical practitioners of Glasgow and the West of Scotland, held in the Faculty Hall on March 27th, under the auspices of the Royal Faculty of Physicians and Surgeons of Glasgow, questions arising out of the need of the Army for more doctors were discussed. Dr. Ebenezer Duncan, President of the Faculty, was in the chair. Dr. McGregor Robertson's motion "that this meeting is of opinion that the time has come when the whole nation should be mobilised for the successful and rapid conclusion of the war, so that all fit persons shall be liable to be called upon by the Government to render such service in naval, military, and civil departments as they may be deemed suitable for, due regard being paid to age, training, and circumstances," was unanimously adopted, as well as a further motion expressing the opinion (of the meeting) "that to compulsorily mobilise the medical profession in advance of the rest of the community would be unjust alike to the profession and the community at large." A motion proposed by Dr. Charles Robertson, to the effect "that the committee to be appointed by the Government in the event of the mobilisation of the medical profession shall supersede the Scottish Medical Service Emergency Committee, and shall contain a majority of medical practitioners in active general practice," was carried by 45 votes to 42.

GENERAL HOSPITAL, BIRMINGHAM.—The 137th annual report is issued with an appeal for an additional income of £7000 per annum to meet the greatly increased cost of all necessaries. The number of in-patients treated in 1916 was 5562, distributed as follows: civilian 5230, military 332, an increase of 146 over the previous year, the daily average number in the hospital being 341, or an increase of 25 over the average of the past five years. The number of children receiving treatment as in-patients was 1001, of whom 214 were under two years of age. The total income for the year, including special donations and grants from the War Office, was £32,033, as against an expenditure of £38,811, thus leaving a deficit of £6778.

Correspondence.

"Audi alteram partem."

THE CLOSURE OF COLOTOMY OPENINGS.

To the Editor of THE LANCET.

SIR,—My paper on this subject in your issue of March 10th has called forth a number of letters—the best compliment that could be paid to it—which clearly show there is as yet no general agreement among surgeons as to the best method of closing colotomy openings.

Mr. Bernard Roth considers that his method of closing a colotomy, described in his letter of March 17th, is simpler than those I suggested, but it is difficult to see why. I should have thought it was much more complicated, but apart from this, a serious objection to it is that the bowel has to be divided within the abdominal cavity, a practice which all abdominal surgeons, I think, agree in considering bad. Mr. Sinclair White and Mr. Percival Cole both prefer Greig Smith's extraperitoneal method of closing a colotomy opening. I am well acquainted with this method and have used it a number of times in the past, but I thought it was now quite dead or I should have mentioned it in my paper. It appears to me to belong to the same category as lumbar colotomy and to the time when surgeons were afraid of opening the abdominal cavity. What is the objection to opening the abdominal cavity? Mr. Sinclair White himself says, "Every now and then the parietal peritoneum has been punctured, but in no case has this made any difference." Why not then open it deliberately instead of attempting to do the operation extraperitoneally? The extraperitoneal operation is very liable to leave a weak place in the abdominal wall, and many patients have subsequently to wear belts. It also leaves a condition which is not normal and is liable to cause trouble later. While Greig Smith's operation may possibly be quite justifiable in old people, it is certainly unsuitable for young men wounded in the war, who have a strenuous life in front of them; and I cannot see that it has any advantage over straightforward resection and suture.

My object in writing my paper was to describe (1) the easiest, and (2) the best methods of closing a colotomy. There can, I think, be no doubt that the enterotome method is by far the easiest, and it undoubtedly gives excellent results. I have never known peritonitis follow its use, and Mr. Paul, of Liverpool, who used it extensively, has not, I believe, recorded a failure with it.[1] Although it is open to some of the same objections as Greig Smith's operation, it has the advantage that it involves no narrowing at the line of union and no extra-peritoneal bowel. There can surely be no doubt that the best method is that which restores the colon to its normal condition—namely, resection and direct suture. I am surprised to hear that temporary colotomy is a common operation in civilian practice and is performed as a routine in cases of cancer of the colon unaccompanied by obstruction. Why are surgeons so shy of primary resection and suture of the colon that they subject their patients to three operations where one would do? In cases of cancer of the colon accompanied by obstruction there can be no doubt as to the necessity of a temporary colotomy, but this seems an altogether unnecessary procedure in cases unaccompanied by obstruction unless other factors are present which contra-indicate immediate resection and suture.

After having used all the older methods, I now always perform immediate resection with end-to-end suture in suitable cases, and have not had a single failure to date. I see Mr. Finch has doubts as to the safety of getting the patient's bowels open on the second day. Let me assure him that one of the secrets of success with anastomosis of the colon is not keeping the patient constipated. Flatus in the bowel is far more dangerous than a little liquid fæces. The one thing to avoid is the presence in the neighbourhood of the anastomosis of masses of hard fæces and the consequent necessity for drastic purgatives. If the bowels are kept acting daily by small enemata or small doses of salts the risk of leakage is greatly reduced and the colon is kept clean from accumulated and infected blood-clot.

I am, Sir, yours faithfully,

March 31st, 1917. P. LOCKHART-MUMMERY, F.R.C.S.

[1] Brit. Med. Jour., July 27th, 1912

THE LUMLEIAN LECTURES ON HEART DISEASE.

To the Editor of THE LANCET.

SIR,—When a few years ago Sir James Mackenzie, in a public lecture, accused physicians in general, and my teachers in particular, of preaching nonsense I passed the matter by as possibly explicable by his ignorance of what was taught in English schools, but now Dr. G. A. Sutherland repeats the same inaccuracies, I feel bound to protest in the name of fair play and truth, and with your permission would criticise a few of Dr. Sutherland's mistakes.

The function of the heart, as taught to me by Sutton and Clark, was not one only—viz., that of contractility—and they were as well aware as Dr. Sutherland that it had four chambers which under pathological conditions did not work harmoniously. They knew a good deal about its rhythm, excitability, and tonicity as bearing on clinical medicine. I would suggest that their cardiac tonics did reach the heart and so let us hope Dr. Sutherland's do, or his treatment must be very feeble. Valvulitis Dr. Sutherland mixes up in a most casual way with the *effects* of an old endocarditis, but whatever he may mean by it Sutton and Clark never taught that prognosis and treatment were based on the valvular lesion present. If Dr. Sutherland ever evolved from his own inner consciousness the idea that valvulitis is the central factor in heart disease it has naturally misled him, though he may still find infective endocarditis a condition that will demand a good deal of attention.

Where did Sir James Mackenzie (supposing Dr. Sutherland to have got it from him) get the idea that it was taught that back pressure was the *cause* of heart failure? I am sure we were never taught any such foolishness; we were taught, and I still believe it to be true, that failure of the heart causes venous congestion, and this in turn interferes with the function of many organs—stomach, liver, kidneys, &c. The disappearance of the presystolic murmur of mitral stenosis was well known and was ascribed to failure of the left auricle, and I still believe this is true.

Perhaps after the delivery of his lectures Dr. Sutherland may have time to read the late Sir A. Clark's paper on Cases of Bruits without Heart Disease and Dr. Sutton's Lectures on Pathology; they might save him a good deal of trouble and enable him to give more time to what is true and new instead of disseminating an inaccurate representation of what is old.—I am, Sir, yours faithfully,

Harley-street, W., March 21st, 1917. FRED. J. SMITH.

PS.—Of irregularity and its effects or lack of effects clinically Clark and Sutton knew as much as we do now, and tried to teach us.

MACROSCOPIC *VERSUS* MICROSCOPIC AGGLUTINATION TECHNIQUE.

To the Editor of THE LANCET.

SIR,—In a note in THE LANCET of Feb. 17th on the effect of pyrexia on inoculation agglutinins Lieutenant G. Selby Wilson, in carrying out a series of tests by the micro-scopic and macroscopic methods, finds that the latter gives very much higher readings than the former—that the macroscopic method is, in fact, about 30 times as sensitive as the microscopic.

This marked disparity is, in my opinion, due to the different conditions under which the two series of tests were conducted, and to the very different standard which he takes as the "end-point" by the two methods. The micro-scopic tests were conducted at room temperature, and the time-limit was half an hour.

In his description of the macroscopic technique he does not give particulars as to temperature and time-limit, but, as the technique was stated to be Dreyer's, we may assume that the tubes were kept in a water bath at 55° C. for two hours. Thus, in three respects, the macroscopic tests were at an enormous advantage over the microscopic tests—viz., (1) longer time-limit; (2) higher temperature; and (3) more intimate admixture of serum and emulsion by the convection currents set up in the agglutination tubes when these are placed in the water bath at 55° C. All these factors, especially the third, facilitate the union of agglutinin with agglutinable substance, and in that way make the method more "sensitive." Another factor in producing the marked disparity between the microscopic and macroscopic techniques in Lieutenant Wilson's results is that his end-point by the former method is practically *complete agglutination* while his end-point by the latter method *is a trace of agglutination*.

If Lieutenant Wilson will conduct a series of comparative tests in which the conditions are more nearly comparable, he will find the results by the two methods more nearly coincide. By removing part of the contents of the last tube which shows macroscopic agglutination for examination under the microscope, he will find agglutination micro-scopically—otherwise the macroscopic appearance of agglu-tination in that dilution amounts to an optical delusion. And occasionally the first *negative* dilution macroscopically will, under the microscope, show a *trace of agglutination*.

The advantages of the macroscopic method are so obvious, and so well known to those who have used both, that it seems hardly necessary, when comparing the methods, to do so under circumstances so unfair to the microscopic method.

I am, Sir, yours faithfully,

R. P. GARROW, M.D.,
Egypt, March 12th, 1917. Captain, R.A.M.C.

EXCISION OF THE RETRO-PHARYNGEAL GLAND.

To the Editor of THE LANCET.

SIR,—Mr. Norman Patterson's communication in your issue of last week is of interest in drawing attention to the fact that retro-pharyngeal abscess is in the great majority of cases not due to spinal disease but to disease of the retro-pharyngeal gland. This, however, is now, I think, generally recognised.

I shall be surprised if his method of operation meets with the same measure of agreement. In my own experience no bad results have followed the method of operating through the mouth, and now that, with the aid of the suspension apparatus, this can be carried out with so much ease and comfort, the abscess being opened and the remains of the gland curetted with precision and care so as to avoid material entering the larynx, an external operation seems un-necessary. I am, Sir, yours faithfully,

Glasgow, April 2nd, 1917. W. S. SYME.

Medical News.

UNIVERSITY OF DURHAM: FACULTY OF MEDICINE.—At examinations held recently the following candidates were successful:—

FIRST EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE.

Elementary Anatomy and Biology, Chemistry and Physics.—John James Norman Daniels, Norah Hester Hamilton, John Frederick Charles McColl, Mary Foster Richardson, Henry Rochester Smith, Alice Mary Stenhouse, and William Christopher Wardle.

Elementary Anatomy, Chemistry and Physics.—Leo Norton Knight O'Neill.

Elementary Anatomy.—Edith Short Williamson.

THIRD EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE.

Materia Medica, Pharmacology and Pharmacy; Public Health; Medical Juri-prudence: Pathology and Elementary Bacteriology.—John Maurice Brydson (second-class honours), Dorothy Edith Butcher, Iris Marjorie Cheeseright, Samuel Foskett, Samuel Elijah Goulstine, John Parkinson Higham, David Levinstein, and Hans Wilhelm Wa'ther.

UNIVERSITY OF MANCHESTER.—At examinations held recently the following candidates were successful:—

THIRD M.B. AND CH.B. EXAMINATION.

F. H. Anderson, Mary G. Cardwell, Harriet R. L. Reid, Brian Walley, and Ethel D. Willis.

SECOND M.B. AND CH.B. EXAMINATION.

R. J. Allison, Mary E. Boullen, E. B. A. Edelston, Olive M. Gimson, Archibald Harris, and Annie G. Thompson.

FIRST M.B AND CH B. EXAMINATION.

Part I., Inorganic Chemistry and Physics.—P. D. Abbatt, G. V. Ashcroft, J. B. Bennett, Clifford Boothman, William Broadhurst, H. M. Coope, Eugenia R. A Cooper, N. S. Craig, S. W. Drinkwater, O. M. Duthie, Winifred M. Edghill, H. E. Emmett, E. S. Frischmann, W. H. Gratrix, Marguerite F. Johnstone, J. I. Kelly, Eva G. Le Messurier, Cecil Nelson, L. S. Potter, W. E. Powell, Margaret Pownall, Ragheb Salib, F. H. Scotson, H. L. Sheehan, Margaret Sinkle, J. W. Smith, Benjamin Sykes, S. N. Taylor, Nora M. Walker, Raymond Williamson, James Worthington, and James Yates.

Part II., Biology.—R.S. van Aalten, P. D. Abbatt, Reginald Anderton, G. V. Ashcroft, J. B. Bennett, Nancy E. Bleakley, James Chronnell, H. M. Coope, Eugenia R. A. Cooper, N. S. Craig, S. W. Drinkwater, O. M. Duthie, Winifred M. Edghill, Caroline M. Edwardes-Evans, Gwendolen A. G. Edwardes Evans, H. E. Emmett, T. N.

Fisher, E. S. Frischmann, Edward Gleaves, W. H. Gratrix, Ruth Hill, C. D. Hough, Marguerite F. Johnstone, J. I. Kelly, H. R. Lane, W. L. Martland, Eva G. Le Messurier, Cecil Nelson, A. C. Newman, G. F. S. Parker, L. S. Potter, W. E. Powell, Margaret Pownall, W. G. T. K. Robinson, Ragheb Salib, F. H. Scotson, H. L. Sheehan, Margaret Single, J. W. Smith, Benjamin Sykes, S. N. Taylor, Leo Unsworth, Nora M. Walker, Raymond Williamson, James Worthington, J. R. Wright, and James Yates.

Chemistry.—Nancy E. Bleakley, Caroline M. Edwardes-Evans, T. E. Forshaw, Florence M. I. Graham, C. D. Hough, A. C. Newman, El S. El G. Sheir, Mary I. Turner, and Leo Unsworth.

Physics.—T. N. Fisher.

DIPLOMA IN DENTISTRY (THIRD EXAMINATION).

C. E. Cardwell and Norman Flitcroft.

DIPLOMA IN DENTISTRY (SECOND EXAMINATION).

Dental Mechanics.—E. L. Morgan, Frank Torkington, and Harold Walmsley.

Dental Metallurgy.—Teresa Candon, E. L. Morgan, Frank Torkington and W. R. Williams.

DIPLOMA IN DENTISTRY (FIRST EXAMINATION).

E. S. Poulter.

Chemistry.—Stanley Booth, R. V. Littlewood, and Dorothy Marsden.

No meeting of the British Association, which has assembled regularly since 1831, will be held this year.

A UNIFIED POOR-LAW AUTHORITY FOR LONDON.—The London County Council adopted on Tuesday last a recommendation of its Local Government Committee in favour of setting up at once in London a Central Poor-Law Authority.

SOCIETY FOR THE STUDY OF INEBRIETY.—At the annual meeting to be held in the rooms of the Medical Society of London, 11, Chandos-street, Cavendish-square, W., on Tuesday, April 10th, at 4 P.M., Dr. R. Murray Leslie will open a discussion on the Instruction of the Public in the Importance of the Prevention and Arrest of Alcoholism.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—Demonstrations of specimens in the Museum will be given in the Theatre of the College, Lincoln's Inn-fields, by Mr. S. G. Shattock, the pathological curator, at 5 P.M. each Monday, as follows:—April 16th, Syphilis; 23rd, Gunshot Injuries; 30th, Gunshot Injuries. The demonstrations are open to medical students and practitioners, as well as to first-aid and ambulance students.

CHADWICK PUBLIC LECTURES.—The spring course of lectures includes two by Captain C. G. Moor, R.A.M.C.(T.), on the Profitable Keeping of Fowls and Rabbits on Hygienic Methods (April 12th and 19th, 6 P.M., at the Royal Sanitary Institute, 90, Buckingham Palace-road, S.W.); a lecture by Dr. F. W. Mott, F.R.S., on Mental Hygiene in Shell-shock during and after the War (April 26th, 5.15 P.M., at the Royal Society of Medicine, 1, Wimpole-street, London, W.); and three lectures on War-Time Food, by Dr. S. J. Moore, medical officer of health of Huddersfield (April 20th and 27th, and May 4th, 7.30 P.M., at the Municipal College, Lansdowne, Bournemouth). Admission to the lectures is free. Particulars from the Secretary of the Chadwick Trust, 40 (6th), Queen Anne's Chambers, London, S.W. 1.

PAYMENT FOR THE DOMICILIARY TREATMENT OF TUBERCULOSIS IN BELFAST.—A Belfast correspondent writes: Under the tuberculosis scheme payments are made to doctors for domiciliary treatment, and in Belfast, at the March meeting of the City Council, a list of payments made to local doctors for this purpose during the past year was presented in the Tuberculosis Committee's minutes for the approval of the Corporation. The total amount was £4,535, divided amongst 101 doctors in amounts varying from £600 to 5*s*., payments being made according to the number of visits. Among the recipients were several members of the Corporation, and the question now arises of the legality of such payments. It is reported that the difficulty will be got over by some of the medical members resigning their seats, unless the question can be otherwise solved.

THE ROYAL PORTSMOUTH HOSPITAL.—At the annual meeting of the Royal Portsmouth Hospital held on March 27th the report for the past year was presented. It stated that the number of civilian in-patients treated was 2098, of military 598, that the daily average number of beds occupied was 160, and that the average cost per bed occupied was £71 11*s*. 5*d*., as compared with £65 5*s*. 6*d*. in 1915. The year closed with a debt of £1369. The heightened expenditure of £12,308 was due to the great increase in the cost of provisions, drugs, and other necessaries. Dr. J. T. Leon, an assistant physician for 15 years, whose death had recently occurred, bequeathed £500 to the hospital. The treatment of venereal diseases in the district had been taken in hand, at the invitation of the Portsmouth county borough council, the committee agreeing to coöperate with the council in carrying out the proposals of the Local Government Board on the understanding that no portion of the cost should fall upon the funds of the hospital.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

Criminal Law Amendment Bill.

THE Criminal Law Amendment Bill has been passed by a Standing Committee of the House of Commons and been ordered to be reported to the House. One or two interesting matters were discussed in the later stages of the Bill. On Wednesday, March 28th, Mr. DICKINSON proposed to insert a new clause imposing a penalty on a person who, knowing that he was suffering from venereal disease in a communicable form, communicated it to another person otherwise than by sexual intercourse or by gross neglect. The Bill already contained a clause dealing with the communication of disease by sexual intercourse. Sir G. CAVE, the Home Secretary, observed that the proposed new clause as it was framed would render it almost impossible for a person affected by venereal disease to continue to live. The proposal, however, found considerable support amongst members of the Committee, and a division showed that 16 Members were on each side. In the event of a tie the custom is for the chairman to give his casting vote on the side of leaving the matter open for further consideration. Accordingly he voted against the proposed new clause, which was rejected. A clause was brought forward by the Home Secretary to permit of the detention in an approved institution or home of a girl under the age of 18 who was convicted of importuning or solicitation. The detention is to last until she is 19.

National Insurance (Part I. Amendment) Bill.

Sir EDWIN CORNWALL has introduced in the House of Commons a Bill designed "to amend the enactments relating to National Health Insurance with respect to persons suffering from disablement in consequence of the present war." It was read a first time.

HOUSE OF COMMONS.

WEDNESDAY, MARCH 28TH.

Hospital Accommodation at Sandhurst.

Answering Mr. EVELYN CECIL, who asked a question respecting increased hospital accommodation at the Royal Military College, Sandhurst, Mr. MACPHERSON (Under Secretary for War) said: Temporary arrangements have been made to provide extra hospital accommodation in the Commandant's quarters at the Staff College, where 20 beds have been allotted, and during the recent outbreak of mumps certain of the halls of study were utilised. Further hospital improvements are under consideration. There have been two deaths, one from cerebro-spinal fever and the other from pneumonia.

THURSDAY, MARCH 29TH.

Dispensary Medical Men in Ireland.

Mr. DORIS asked the Chief Secretary for Ireland to state under what statute or by what authority the Local Government Board for Ireland claimed the right to object to the appointment of Dr. George Maguire as medical officer of Newport (Mayo) dispensary district, on the grounds that he was of military age; and, if the Board had no such legal right, would he advise the immediate sanction of the appointment, so that the sick poor of this district might have the medical attendance to which they were entitled.—Mr. DUKE replied: Under the Poor Law Relief (Ireland) Act, 1851, the approval of the Local Government Board is required to any appointment of the medical officer of a dispensary district.

Mr. DORIS: Can the right honourable gentleman give me the grounds why this gentleman was not sanctioned?—Mr. DUKE: My impression is that he was not sanctioned because he was of an age when he was eligible to render much more important services to the State.

Convalescent Homes for Nerve-strained Soldiers.

Mr. KING asked the Pensions Minister whether he would specify what arrangements were being made by his department as to the provision of convalescent homes, entirely unconnected with lunacy, for soldiers of the rank and file discharged from the Army owing to uncertifiable nerve-strain where the men had cheerful surroundings and facilities for industrial occupation; and whether any allocation had been made from the National Relief Fund for this purpose under the administration of groups of local committees.—Mr. BARNES wrote in reply: Cases of the kind referred to are being sent by local committees to ordinary convalescent homes which are entirely unconnected with lunacy. A special institution will shortly be opened as an experiment at Golders Green in which men suffering from nerve-shock will be suitably treated and provided with occupation. It is not intended to draw upon the National Relief Fund or this purpose.

Military Service (Review of Exceptions) Bill.

In moving the second reading of the Military Service (Review of Exceptions) Bill, Mr. BONAR LAW (Chancellor of the Exchequer) explained at length the provisions of the measure, which is to permit of the re-examination of men who have been discharged from the Army or rejected at a previous medical examination. He stated the military needs for more men, and said that the Bill would enable the military authorities to deal with a million men, from whom it was hoped to obtain 100,000 recruits. In a long war like this standards had changed and must continually change. Men who were rejected in the earlier stages of the war would now be taken. During part of the Derby recruiting campaign an immense number of men came forward at one time. There were, he believed, on one day as many as 300,000. In these circumstances medical examination was not as thorough as it ought to have been if there had been more time. That was shown on the other side of the picture when many men were taken where it was a distinct disadvantage that they should have been. They were taken on account of being passed improperly by medical boards. If that was so, it might be assumed that some had been rejected who might well have been passed and it was not unfair that they should again be subjected to examination. As to the re-examination of men, he said that the Army Council had had their lesson with regard to medical examination. It was not in their interests either to take men who were not fit for service or to employ the very limited medical staff in constantly examining men who would never be fit for service.

Mr. HOGGE, in submitting an amendment dealing with the pension rights of men who would be brought into military service under the Bill, urged that if men passed the medical examination there should be no question of pre-existing weakness if they afterwards broke down.

Mr. PRINGLE criticised at length medical examinations as they had been conducted.

Mr. ASQUITH said that it was assumed that the men who were going to be re-examined included men who hitherto had been exempted on medical grounds. But some of them might be men who, having been originally passed and gone into the Army, had been discharged as unfit for service. He did not wish to dogmatise, but, so far as he had been able to familiarise himself with the facts, he was not at all sure that an equal number of men had not been passed into the Army who ought to have been. It was a very disputable point as to where the balance lay. No one wished to protect men who had been rejected on imperfect evidence. It was perfectly right that they should be re-examined and perhaps subjected to a fuller examination.

Mr. BONAR LAW said that he would ask the War Office whether it was possible to make the medical examination so perfect as to run no risks of passing unfit men.

Sir RYLAND ADKINS hoped that the services of civilian medical men with their varied experience of many kinds of disease should be utilised to a greater extent in conducting the medical examinations.

Sir MAURICE LEVY asked for an assurance as to the thorough character of the medical examinations.

Mr. MACPHERSON (Under Secretary for War) said that some attacks had been made upon the medical men who had been examining recruits for the last few months. There had been heavy recruiting rushes. He was not surprised that some doctors did make mistakes, but honourable Members would not find a Harley-street specialist looking back upon his medical prognoses and diagnoses who had made less than 1 per cent. of mistakes. He could confidently say that out of 1,500,000 cases the doctors had not made mistakes amounting to more than 1 or 2 per cent. He thought that it was greatly to the credit of the doctors that they had performed the work to such great satisfaction.

The second reading was carried by 175 votes to 18.

In the discussion in Committee on the Military Service (Review of Exceptions) Bill on Friday, March 30th, considerable criticism arose on the provision which permitted men who had been discharged for wounds and sickness incurred at the front to be re-examined.

Sir MAURICE LEVY moved an amendment to the effect that the medical re-examination should be undertaken by a board of not less than two medical men, one of whom should be the man's own doctor if he so desired.

Mr. MACPHERSON pointed out that it would be impracticable to have a rule that the man's own doctor should be on the board who re-examined him. The Government had already stated that the examinations would be made by competent medical boards, including the best available civil medical ability. Two out of every three medical men on the boards would be civilians. A direction might, however, be given by the War Office to the medical boards to receive a certificate from a man's own doctor.

The amendment was withdrawn.

MONDAY, APRIL 2ND.

Hygiene in T.N.T. Factories.

Lord H. CAVENDISH-BENTINCK asked the Minister of Munitions whether his attention had been called to the fact that in some Government T.N.T. factories there were many breaches in the regulations designed to safeguard the health of the workers; was he aware that the exhaust ventilation provided was imperfect and inadequate; that the mess-room, cloak-room, and washing accommodation was also inadequate; and that the distinction between the clean and dirty side of factories had been abandoned so that the garments of those engaged on poisonous and non-poisonous processes mingled together; and would he say what action he proposed to take to improve the conditions.—Dr. ADDISON replied: A set of rules for observance in T.N.T. factories has recently been issued by the Ministry. These embody the practice which has proved most successful in T.N.T. factories, and it is my intention to ensure that the rules as published are complied with in all these factories.

The Calling Up of Medical Students.

Answering Sir W. BYLES, Mr. MACPHERSON (Under Secretary for War) wrote: The arrangements at present in force with regard to all students, including medical students, are that students are not in ordinary circumstances called to the colours if, being under the age of 31 they are classified lower than B 1, or if they are 31 or over and are classified lower than A. Any student falling under this arrangement is, unless in possession of a tribunal exemption, required to join an Officers' Training Corps. In view, however, of the requirements of the R.A.M.C., medical students in any class who are within 24 months of taking their medical degree or licence are not called up if they join an Officers' Training Corps.

TUESDAY, APRIL 3RD.

Military Service (Review of Exceptions) Bill.

In the course of the proceedings in report on this Bill, Mr. PRINGLE moved an amendment to provide that in any case where a man examined under the measure and passed for military service produced a medical certificate that he was unfit for general service, or for any form of military service, he should be entitled to be re-examined by a special Medical Board.

Mr. FORSTER (Financial Secretary to the War Office) resisted the amendment on the ground that the mere fact that the man had been previously rejected would be enough to put Medical Boards on their guard in conducting the examinations.

Many honourable Members urged the Government to accept the substance of the amendment. Sir W. COLLINS thought that there should be an opportunity of consulting specialists in these cases.

Sir J. SIMON said that he was sure that Medical Boards had done their duty to the best of their resources, but they had a very hard task. It was well known that some very serious mistakes had been made, and it was desired that these mistakes should be minimised in the future. It might be said that there might be cases where medical certificates given at short notice without previous knowledge of the case might not be very valuable. But was it not possible that a qualification should be introduced into the amendment to secure that the certificate should only come from a practitioner who wrote with a personal knowledge of the man's medical history? The medical man might also be required to state what in his opinion was the reason why the man should not be called upon to serve.

Mr. FORSTER replied that all honourable Members were at one in trying to secure fair treatment for the men and fair treatment for the Army. He did not want to make any reflections on the medical profession, because taken on the whole it was a singularly honourable profession, but it was generally agreed that some medical certificates were worth a great deal more than others. If it could be secured that all the medical certificates to be submitted to the Medical Boards were of the better character, then he would not hesitate to accept the amendment, but he was afraid that at present he was unable to accept the view that the presentation of a medical certificate by the man who was being examined ought to secure for him an examination by a special Medical Board. He clearly recognised the strong view expressed in the course of the debate, and he would undertake to consult with the Secretary of State for War and his advisers before the Bill was passed, to see how far it was possible to meet the wishes of the House. Further than that he could not go.

The amendment was rejected by 128 votes to 44.

The Bill afterwards received a third reading.

THE death is announced of Emil von Behring, professor of hygiene in the University of Marburg.

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).
When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

ALL SAINTS' HOSPITAL FOR GENITO-URINARY DISEASES, Vauxhall Bridge-road, S.W.—Clinical Assistant for afternoon work in Out-patient Department.

BLACKPOOL, VICTORIA HOSPITAL.—House Surgeon. Salary £250 per annum, with board, &c.

BODMIN, CORNWALL COUNTY ASYLUM.—Female Junior Assistant Medical Officer. Salary £200 per annum, with board, &c.

BOLTON INFIRMARY AND DISPENSARY.—Senior House Surgeon. Salary £230 per annum, with board, &c.

BOOTLE BOROUGH HOSPITAL.—Junior House Surgeon. Salary £170 per annum, with board, &c.

BRIGHTON, ROYAL SUSSEX COUNTY HOSPITAL.—House Physician and Junior House Surgeon. Salaries at rate of £100 per annum, with board, &c.

BRISTOL ROYAL HOSPITAL FOR SICK CHILDREN AND WOMEN.—Female House Surgeon. Salary £150 per annum, with board, &c.

BRISTOL ROYAL INFIRMARY.—House Physician and House Surgeon. Salary at rate of £120 per annum, with board, &c.

BURY INFIRMARY.—Junior House Surgeon. Salary £150 per annum, with board, &c.

CUMBERLAND, COUNTY OF.—Female Assistant Medical Officer. Salary £350 per annum.

DERBYSHIRE SANATORIUM FOR TUBERCULOSIS, Walton-lane, near Chesterfield.—Assistant Medical Officer. Salary £300 per annum, with board, &c.

DEVONPORT, ROYAL ALBERT HOSPITAL.—Assistant House Surgeon, unmarried. Salary £150 per annum, with board, &c.

EAST LONDON HOSPITAL FOR CHILDREN, Shadwell, E.—Female Assistant Resident Medical Officer. Salary £125 per annum and all found.

HAMPSTEAD GENERAL HOSPITAL, Haverstock Hill.—Casualty Officer for Out-patients' Department. One whole time, salary at rate of £150 per annum, with board; or two half-time at rate of £75 per annum each, lunch and tea provided.

LEEDS PUBLIC DISPENSARY.—Second Female Resident Medical Officer. Salary £200 per annum, with board, &c.

LIVERPOOL UNIVERSITY, FACULTY OF MEDICINE.—Lectureship in Ophthalmology.

MANCHESTER, ANCOATS HOSPITAL.—House Physician. Salary £150 per annum, with board, &c.

MANCHESTER NORTHERN HOSPITAL FOR WOMEN AND CHILDREN, Park-place, Cheetham Hill-road.—House Surgeon. Salary £150 per annum, with board, &c.

MOUNT VERNON HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Fitzroy-square, W., and Northwood.—Ophthalmic Surgeon.

NETLEY, BRITISH RED CROSS HOSPITAL.—Two Junior Medical Officers.

NEWCASTLE UPON-TYNE EDUCATION COMMITTEE.—Assistant School Medical Officer. Salary £300 per annum.

NEW HOSPITAL FOR WOMEN, Euston-road, N.W.—Female Assistant Physician and Assistant Surgeon.

QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal Green, E.—House Physician, Casualty House Surgeon, and House Surgeon for six months. Salary £100 per annum, with board, &c.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford.—House Surgeon.

ROTHERHAM HOSPITAL.—Junior House Surgeon. Salary £150 per annum, with board, &c.

ROYAL HOSPITAL FOR DISEASES OF THE CHEST, City-road, E.C. 1.—Assistant Medical Officer for Tuberculosis Dispensary. Salary £350 per annum.

SHEFFIELD ROYAL INFIRMARY.—House Physician. Salary £120 per annum, with board, &c.

SHREWSBURY, SHIRLETT SANATORIUM, Shropshire.—Temporary Assistant Resident Medical Superintendent. Salary £300 per annum.

SOUTH LONDON HOSPITAL FOR WOMEN, 103, South Side, Clapham Common, S.W. 4.—Female House Physician for six months. Salary at rate of £100 per annum, with board, &c.

STOKE-ON-TRENT COUNTY BOROUGH.—Temporary Tuberculosis Officer. Salary £500 per annum.

WEST BROMWICH AND DISTRICT HOSPITAL.—Assistant House Surgeon. Salary £120 per annum, with board, &c.

WHITEHAVEN AND WEST CUMBERLAND INFIRMARY.—Resident House Surgeon. Salary £120 per annum, with board, &c.

THE Chief Inspector of Factories, Home Office, London, S.W., gives notice of a vacancy for a Certifying Surgeon under the Factory and Workshop Acts at Brynamman (Carmarthen).

Births, Marriages, and Deaths.

BIRTHS.

JEFFREY.—On March 23rd, at Glenbank, Jedburgh, the wife of John Jeffrey, M.B., F.R.C.S.E.—a son.

MCALLUM.—On March 28th, at Scotswood, Milford-on-Sea, the wife of J. H. McAllum, R.A.M.C.—a son.

MARRIAGES.

FRASER—MELLOR.—On March 27th, at the Parish Church, Ashton-under-Lyne, Thomas Lochhead Fraser, Captain, R.A.M.C., to Dorothy Walton, only child of the late Mr. A. E. Mellor, J.P., of Springfield View, Ashton-under-Lyne.

PEARSE—WILBURN.—On March 30th, at St. Saviour's Church, Colgate, Captain Robin Pearse, F.R.C.S., C.A.M.C., of Toronto, to Amy Christine, eldest daughter of Mr. and Mrs. E. J. Wilburn, The Croft, Southwick.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Short Comments, and Answers to Correspondents.

MEDICAL NOTES IN HISTORICAL MANUSCRIPTS: THE STUART PAPERS.

PART VI. of the Stuart Papers, belonging to His Majesty the King and preserved at Windsor Castle, has been issued under the auspices of the Historical Manuscripts Commission. These papers were formerly the property of the titular King James III., otherwise the Old Pretender, and his sons, Charles Edward and Henry, the Cardinal Duke of York, and after the latter's death were, with some trouble, acquired by the representatives of the British Crown. The papers now given to the world in six bulky volumes possess, it goes without saying, great historical value. So far as matters of special interest from a medical point of view are concerned, however, there is nothing to be noted beyond descriptions of the illnesses and death of Mary of Modena (Queen of James II.), references to the health of her son, the titular James III., and allusions to their respective medical attendants. As bearing on these points we give the following excerpts from the calendar:—

Court Physicians and Surgeons.

James II. to the Duke of Powis (Lord Chamberlain of the Household).—1695, June 25, St. Germains.—Warrant for swearing and admitting Sir William Waldegrave to be first physician to the King.

James III. to James Porter (Vice-Chamberlain of the Household).—1701, Oct. 24, St. Germains.—Warrant for swearing and admitting the following persons to the following places: John Constable, first physician in ordinary to the King; Calahan Garvan, physician to the Household.

Warrants, dated July 20 and 23, 1706.—For Calahan Garvan and Laurence Wood to be physicians in ordinary to his Majesty (James III.).

Queen Mary to Walter Crane, Gentleman Usher of the Privy Chamber.—1714, Nov. 29, St. Germains.—Warrant for swearing and admitting Michael Bermingham into the place of one of her chirurgeons.

James III. to Joseph Parrelly, Doctor of Medicine.—1761, Aug. 1, Avignon.—Warrant constituting him one of his extraordinary physicians.

Michael Bermingham to James III.—1718, May.—A petition in French stating that he was a native of London and had been for several years a surgeon both at the Hotel Dieu and the General Hospital at Paris and that the late Queen Mother had in 1714 appointed him her sworn surgeon, and praying to be appointed surgeon to his Majesty in reversion after Monsr. Beaulieu without any wages or emoluments.

Health of Mary of Modena.

The Duke of Berwick to James III.—1714, Feb. 4, St. Germains.—"The Queen has had a little shivring this afternoon and her pulse is quick, but Doctor Garvan hopes that a breathing swett will carry it of, so your Majesty need not be in paine about her."

The Same to the Same.—1714, Feb. 15, Versailles.—"This is to give your Majesty an account that this morning at half an hour past eight I left the Queen in a very good way; she had rested in the night; her pulse was pretty well, though not free from feavour, which the doctor does not expect will leave her yet some dayes; in short, we have much more to hope than to feare, and barr accidents we may reckon her almost out of danger."

The Same to the Same.—1714, Feb. 17, 8.30 A.M., St. Germains.—"Doctor Garvan gives an account of the Queen's condition; she is, thank God, in a mending way, though it will come on sloughly. The Physicians finds her pulse almost quite right. She looks much better, and her voice is considerably stronger, so that we have all reason to hope she will doe well.

James III. to Mr. Dicconson.—1714, Feb. 24, Barr.—"My heart is now at ease intirely as to the Queen's health, of which last night's letters brought so comfortable an account. When nothing but strength is wanting, that is soon gained. For God's sake take care she manage herself and do nothing to disorder her, and above all not endeavour to write too soon, for, as great a comfort as 'twould be to me to see her hand again, I had much rather be longer without that satisfaction than that she should in the least incommode herself for it."

The Duke of Berwick to James III.—1714, Feb. 24, St. Germains.—"The Queen, thank God, continues in a thriving way, and I hope within eight dayes she may beginn to sitt up. She sleeps and eats well."

Queen Mary to Mr. Dicconson.—1714, July 5, Chaillot.—"I have bathed this morning, and am very well. I shall know to-morrow by Mr. Garvan the French doctors' advice as to my drinking of waters and which they think best for me."

The Same to the Same.—1714, July 7, Chaillot.—"The French doctors are of opinion I should go to Plombières."

The Duke of Berwick to James III.—1715, April 24, St. Germains.—"Your Majesty will have an account by the doctors of the Queen's sickness. I hope that the quinquina will carry it soon of, but I beginn to fear her journey will not be, or at least of a good while."

The Same to the Same.—1715, April 29, St. Germains.—"The Queen, thank God, is free of her feavour, and I make no doubt but with the continuation of her quinquina will not have it any more, but I do not think it possible for her to be soon in a condition of travelling."

The Same to the Same.—1715, May 3, St. Germains.—"The Queen is much better, but still very weak."

Queen Mary to Mr. Dicconson.—1715, May 26, Chaillot.—"I thank God I have no other ailement than the gout. I had a great deal of peine last night, but, after I was a bed, I grew better and I slept

well. I am pretthy well to-day, but not able to sett my foot to the ground."

The Same to the Same.—1715, May 27, Chaillot.—"Tho' the peine in my foot is very much abated, yett it is very red, and very much swelled, so that I don't think I can putt it to the ground, nor will I trye if I can, till to-morrow; but I think it necessary Dr. Garvan and Beaulieu should see it to-morow or Wednsday. Therefor pray gett them a Bureau chair to com hether one of these two days that I may resolve with theyr advice what to do."

General George Hamilton to the Duke of Mar.—1716, Feb. 13, Paris.—"The Queen has not been very well with some touches of the gout."

L. Inese to the Duke of Mar.—1717, Sunday, Sept. 5.—"Queen Mary hath been much out of order of late by colics and a looseness that hath mightily weakened her. She is now much better."

Queen Mary to Mr. Dicconson.—1717, Sept. 19, Chaillot.—"I was farr from well all day yesterday, but I have had a good night by the help of treacle and ladonum drops, and am well enough to-day."

L. Inese to the Duke of Mar.—1717, Monday, Dec. 20.—"Queen Mary herself has been and still is indisposed, though without any danger. She had a great pain in her hand before it swelled, but now she is much more easy. Her physician is not sorry that her ailments are turned to the gout."

(*To be continued.*)

THE ROYAL SOCIETY OF MEDICINE AND THE JOURNALS OF MILITARY HOSPITALS.

To the Editor of THE LANCET.

SIR,—A number of military hospitals, both here and at the front, are printing "Gazettes," and many of them contain matter which cannot fail to be of interest to the future historian of the medical aspects of the war; and it is, therefore, important that some complete sets of each should be preserved. I presume that those responsible for their issue deposit the usual copyright copies at the British Museum and the other copyright libraries, but my object in writing is to urge that they should also send complete sets (preferably two sets) to the library of this Society, the largest medical library in the Empire. I would undertake that they would be carefully bound and preserved and would always be available for reference.

I am, Sir, yours faithfully,
J. Y. W. MACALISTER, Secretary.

1, Wimpole-street, W., March 30th, 1917.

UNTAPPED SOURCES OF STARCH.

To the Editor of THE LANCET.

SIR,—In an interesting book published in 1854 under the title of "Wanderings among the Wild Flowers: How to See and How to Gather Them," containing two chapters on the economical and medicinal uses of our native plants, by Spencer Thomson, M.D., F.R.C.S.E., reference is made to the *Arum maculatum* as a source of starch. "The tuber of the arum in its natural state," says the author, "contains an acrid juice along with a considerable amount of starchy flour; the latter when freed from the acridity constitutes a nutritious article of diet"; and in the chapter dealing with the economic properties of British wild plants he adds: "the root-tubers of the arum or cuckoo-pint are collected and prepared for sale." In view of the great need for home-grown starch at the present time it would be interesting to know whether the arum could be cultivated with any prospect of adding to our supply. In Elizabethan times arum starch was used to stiffen ruffles, and it might still serve the purpose of starching linen instead of wasting upon mere vanity any of our present scanty stock of starch.

I am, Sir, yours faithfully,
CERES.

March 30th, 1917.

"LA BAIONNETTE."

LONG years ago it was said that the true test of wit was whether it could be translated into a foreign language and lose no point thereby. A mere pun will not bear this test. The following, extracted from the number of *La Baïonnette* of March 1st, will, perhaps, pass the test:—

La Paperasse.

Quelqu'un l'a dit: pour tuer un homme il faut dépenser son poids de plomb.

Mon ami, je puis vous assurer que, pour le guérir, il faut au moins trois fois son poids de papier!

The sketch shows an officer with his right arm in a sling interviewing an army official seated at a table with enormous piles of papers stacked up at either hand and a few loose sheets flying around the room. It is true that we have all heard that it takes a man's weight in lead to kill him, but we have not all yet heard that it takes three times his weight of paper to cure him—and paper is so dear now. This highly coloured and amusing paper looks with a comic but sympathetic eye on the medical and Red Cross work in the war and its responsible editors are M. Gus Bofa and Jean Villemot, who are careful to state that the sketches are purely imaginative and that no ill-will must be suspected towards any medical or auxiliary staff. The number costs 25 centimes and is published on Thursdays at 30 rue de Provence, Paris.

GUM AS A FOOD.

THE question of how far gum is utilisable as food in the same way as starch and sugar is probably not yet finally settled. It seems to have exercised the minds of pharmacists and medical men for a long time, some affirming that orientals could live on gum alone and others denying or doubting it, supporting their denials by reference to experiments performed by well-known observers or by themselves. Pavy said that "gum is, doubtless, susceptible of being utilised as an alimentary principle, although nothing definite is known about what becomes of it when introduced into the alimentary canal." He adds: "I have experimented both upon rabbits and dogs with reference to this point." Magendie also fed dogs on gum, but they apparently soon died from inanition. The varieties of gum, however, are many, and their properties undoubtedly vary owing to the mixtures of different gums by natives and dealers. In 1847 Mr. John Savory, the President of the Royal Pharmaceutical Society of Great Britain, wrote as follows of gum arabic:—

Among the demulcent substances, gum Arabic is the most frequently used in the practice of medicine. It is sometimes given alone to relieve tickling coughs, by allowing it to dissolve slowly in the mouth. A solution of this gum, in the proportion of one ounce to a pint of barley water, taken to the extent of a wineglassful, furnishes an excellent beverage in cases of inflammation of the kidneys and bladder and in the inflammatory stage of gonorrhœa. From its light and supposed digestible nature, it is considered a wholesome and nutritious food, thousands of the Moors supporting themselves entirely upon it during the time of harvest. Hasselquist mentions in his Voyages that a large caravan of Abyssinians would have starved if they had not discovered a stock of gum Arabic amongst their merchandise, on which alone a thousand persons subsisted for two months. About six ounces of this gum are sufficient to support a man for a day: it is mixed occasionally with milk, animal broths, and other victuals.

Gum arabic is said to consist of 70 per cent. of arabin, isomeric with cane sugar, 17 per cent. of water, and potash and lime. Arabinose, or arabin sugar, is a crystallisable sugar or glucose, and is prepared by the action of sulphuric acid on arabin. Fredrik Hasselquist was a Swedish naturalist, and one of the most eminent pupils of Linnæus. Having heard Linnæus express a wish that some naturalist would explore Palestine, he embarked in 1749 and explored Egypt, Arabia, and Palestine, and was about to return with a rich collection when he died at Smyrna in 1752. His valuable observations were published by Linnæus in Swedish, and translated into English in 1766, under the title, "Voyages and Travels in the Levant, 1749–52."

METEOROLOGICAL READINGS.

(*Taken daily at 8.30 a.m. by Steward's Instruments.*)

THE LANCET Office, April 3rd, 1917.

Date.	Rain-fall.	Solar Radio in Vacuo.	Maximum Temp. Shade.	Min. Tem.	Wet Bulb.	Dry Bulb.	Remarks.
Mar. 28	0·05	62	45	30	34	36	Overcast
,, 29	...	79	50	36	41	44	Cloudy
,, 30	0·05	87	51	36	38	39	Cloudy
,, 31	0·25	49	39	34	36	36	Overcast
April 1	0·19	64	41	32	33	35	Overcast
,, 2	0·05	71	40	31	34	34	Snowing
,, 3	0·12	79	44	33	34	35	Cloudy

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

EDITORIAL NOTICES.

IT is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

It is especially requested that early intelligence of local events having a medical interest, or which it is desirable to bring under the notice of the profession, may be sent direct to this office.

Lectures, original articles, and reports should be written on one side of the paper only, *and when accompanied by blocks it is requested that the name of the author, and if possible of the article, should be written on the blocks to facilitate identification.*

Letters, whether intended for insertion or for private information, must be authenticated by the names and addresses of their writers—not necessarily for publication.

We cannot prescribe or recommend practitioners.

Local papers containing reports or news paragraphs should be marked and addressed "To the Sub-Editor."

We cannot undertake to return MSS. not used.

Offices: 423, STRAND, LONDON, W.C. 2.

MANAGER'S NOTICES.

ALTERATION IN THE PRICE OF "THE LANCET."

INCREASED war expenses and cost of production necessitate an increase of the price of THE LANCET. Commencing with the new year, the price was raised to 8*d*. The rates of subscription remain as revised in October.

INLAND.

One Year	... £1 10 0
Six Months	... 0 16 0
Three Months	... 0 8 0

COLONIES and ABROAD.

One Year	... £1 12 6
Six Months	... 0 17 6
Three Months	... 0 8 9

Subscriptions (which may commence at any time) are payable in advance. Cheques and Post Office Orders (crossed "London County and Westminster Bank, Covent Garden Branch") should be made payable to the Manager, Mr. CHARLES GOOD, THE LANCET Offices, 423, Strand, London, W.C. 2.

TO SUBSCRIBERS.

WILL Subscribers please note that only those subscriptions which are sent direct to the Proprietors of THE LANCET at their Offices, 423, Strand, London, W.C. 2, are dealt with by them? Subscriptions paid to London or to local newsagents (with none of whom have the Proprietors any connexion whatever) do not reach THE LANCET Offices, and consequently inquiries concerning missing copies, &c., should be sent to the Agent to whom the subscription is paid, and *not* to THE LANCET Offices.

Subscribers, by sending their subscriptions direct to THE LANCET Offices, will ensure regularity in the despatch of their Journals and an earlier delivery than the majority of Agents are able to effect.

THE COLONIAL AND FOREIGN EDITION is published in time to catch the weekly Friday mails to all parts of the world.

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Quarter Page, £1 10*s*. Half a Page, £2 15*s*.
Entire Page, £5 5*s*.
Special terms for Position Pages.

Advertisements (to ensure insertion the same week) should be delivered at the Office not later than Wednesday, accompanied by a remittance.

Communications, Letters, &c., have been received from—

A.—Lady Angela Adair, Dunadry; Mr. R. S. Adamson, Manchester; *American Journal of Care for Cripples*, New York City; Ancoats Hospital, Manchester, Sec. of; Army Medical Library, Alexandria, Hon. Librarian of; Lieut.-Col. J. G. Adami, A.D.M.S.; Association for Moral and Social Hygiene, Lond., Sec. of; Messrs. Allen and Hanburys, Lond.; Anglo-French Drug Co., Lond.; Messrs. Arnold and Sons, Lond.; Aberdeen University, Secs. of; Mr. R. J. Albery, Lond.; Mr. F. Aldridge, Lond.

B.—Mrs. W. D. Barfitt, St. Ives; Messrs. C. Birchall, Liverpool; British Oxygen Co., Lond.; Birmingham University, Librarian of, Mr. J. G. Bradford, Lond.; Birmingham City, Clerk to the; Dr. R. Mary Barclay, Edinburgh; Capt. A. Barr, A.V.C.; Messrs. W. H. Bailey and Son, Lond.; Birmingham City Education Committee, Sec. of; Messrs. Butterworth and Co., Lond.; Messrs. Bale, Sons, and Danielsson, Lond.; Bristol Royal Hospital for Sick Children, Sec. of; Messrs. T. B. Browne, Lond.; Bootle Borough Hospital, Hon. Sec. of.

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J.—Lieut.-Col. C. H. James, Amritsar.

K.—Messrs. H. S. King and Co., Lond.; Dr. S. M. Kaka, Lond.; Dr. A. P. Kothare, Bombay; Dr. J. E. Kuhne, Hastings; Mr. E. M. Kilroy, Harrow Weald; Kent County Council, Maidstone, County Medical Officer of.

L.—Messrs. Low and Co., Lond.; Rt. Hon. The Lord Mayor, Lond.; Messrs. H. K. Lewis and Co., Lond.; Library of the Rhode Island Medical Society, Providence, U.S.A., Librarian of; Lieut.-Col. J. C. H. Leicester, I.M.S.; Library and Information Bureau, New York.

M.—Dr. C. H. Miller, Lond.; Mr. J. E. R. McDonagh, Lond.; Medical Research Committee, Lond.; Dr. R. Morton, Lond.; Mr. W. Martindale, Lond.; Messrs. C. Mitchell and Co., Lond.; Mr. N. C. Macnamara, Rickmansworth; Mrs. Martin, Torquay; Manchester Royal Infirmary, General Supt. of; Messrs. J. F. Macfarlan and Co., Lond.; Messrs. R. Maurice and Co., Lond.; Dr. F. G. Miranda, Granada; Messrs. C. Moore and Co., Lymm; Messrs. McDowell, Steven, and Co., Falkirk; Mansfield Borough, Town Clerk to the; Military Hospitals Commission, Canada, Ottawa; Dr. A. Morison, Lond.; Mr. J. Y. W. MacAlister, Lond.; Maltine Manufacturing Co., Lond.

N.—Dr. J. B. Nash, Sydney; Newcastle-upon-Tyne Education Committee, Director of.

O.—Dr. J. Oliver, Lond.

P.—*Il Policlinico*, Rome, Editor of; Capt. A. H. Priestley, R.A.M.C.; Price's Patent Candle Co., Lond.; Provincial Board of Health, Victoria, Sec. of.

Q.—Queen's University of Belfast, Sec. of.

R.—Royal Academy of Medicine in Ireland, Dublin; Major C. Russell, O.A.M.C.; Redruth Rural District Council, Clerk to the; Mr. J. C. Ryan, Dublin; Dr. E. D. Rowland, Georgetown; Mr. W. Ramsay, Melbourne; Dr. R. R. Rentoul, Liverpool; Royal College of Surgeons of England, Lond., Sec. of; Reading Pathological Society, Hon. Librarian of.

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